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THE HOPEWELL INTERACTION SPHERE: THE EVIDENCE FOR INTERREGIONAL TRADE AND STRUCTURAL COMPLEXITY

By

MARK F. SEEMAN

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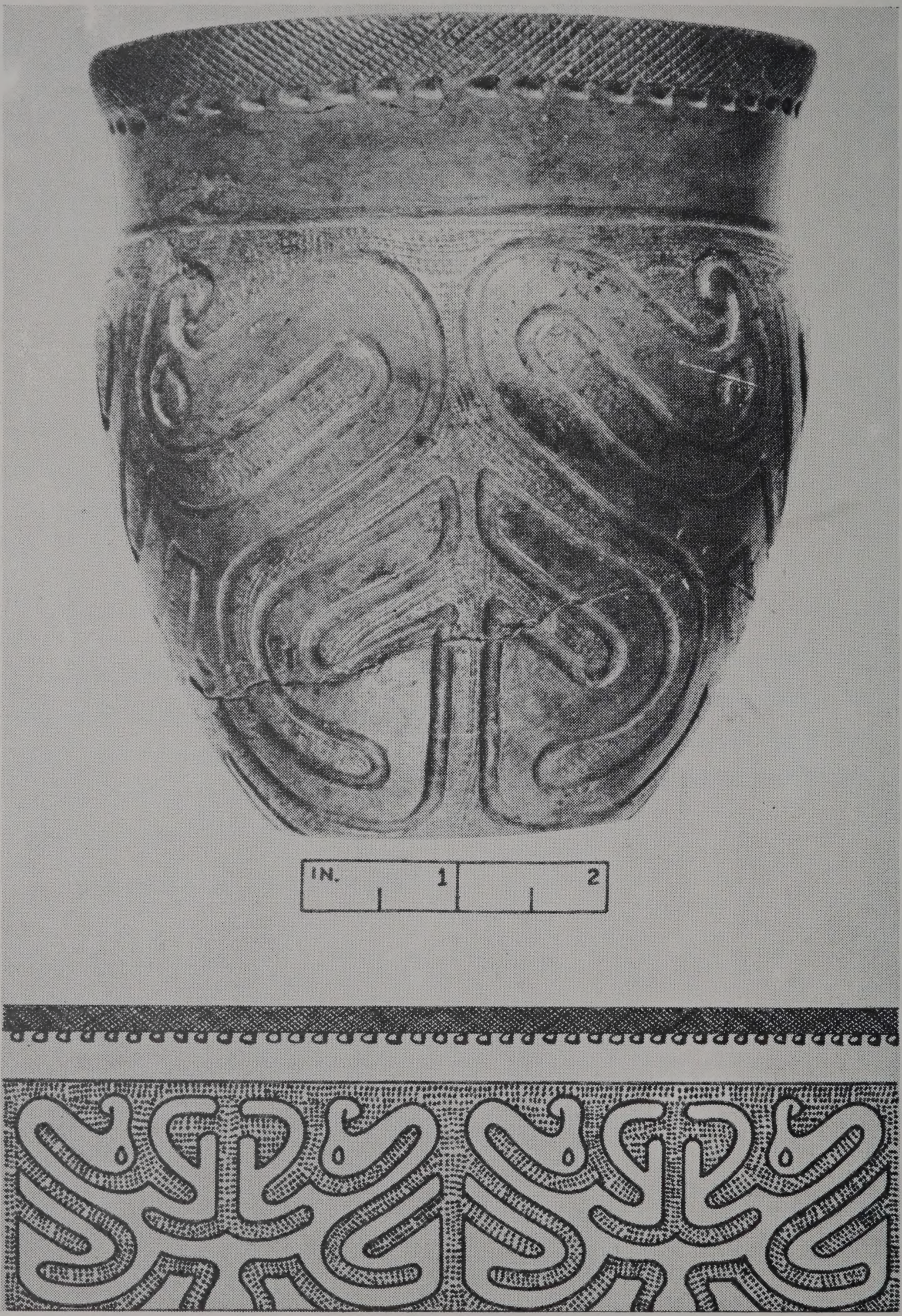

Illinois Archaeological Survey

Hopewell ware jar evidencing the widespread raptoral bird symbol. Pete Klunk Mound 7, Calhoun County, Illinois.

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MARK F. SEEMAN

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INDIANAPOLIS—1979

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PREFACE

When the first Europeans crossed the Alleghenies and settled in what is now the Midwest, they were brought into contact with both an ongoing American Indian culture and the ruins of huge geometric earthworks and burial tumuli. At the time, they were viewed as totally unrelated phenomena. Clearly the extant Indian groups of the area—the Wyandote, Shawnee, and Delaware—did not make use of these constructions. Further, how could such complex structures, worthy of the ancient Egyptians or Babylonians, have been constructed by earlier Indian societies? The popular explanation gradually arose that these mounds and earthworks were built not by Indians, but by a race of Moundbuilders, a people of consummate skill and refinement who had preceded the Indians in North America.

One of the early accomplishments of professional archaeology was the discrediting of the Moundbuilder explanation (see Silverberg 1968). Such late nineteenth-century figures as Frederick W. Putnam, and particularly Cyrus Thomas, mustered evidence supporting a purely Indian origin for the mound and earthwork constructions. Subsequent comparative work led to the recognition that these sites were not only the products of prehistoric Indians, but that there was considerable variation present. To recognize this patterning, a series of classification schemes was developed in the area (e.g., Shetrone & Greenman 1931; Webb & Snow 1945). One of the earliest and ultimately one of the most useful taxa developed within these schemes was that of "Hopewell," a term designed to connote a similarity among a number of sites, primarily burial mounds, in the Midwest.

With the accumulation of new data, the clarification of particular relationships, and the development of new anthropological theory, the meaning of "Hopewell" has changed considerably over the years. Thus, for example, it has been used to connote such divergent phenomena as a religion, a cult, a style, a culture, a cultural climax, a complex, a period, a civilization, a phase, and, most recently, an interaction sphere (see Caldwell 1964, p. 136). It is the last of these, the interaction sphere concept, that will serve as the focus of the present study.

The present monograph is only a slightly modified version of a Ph.D. dissertation submitted to the Department of Anthropology, Indiana University, in 1977. The substantive work was done in 1975 and 1976. It has been shortened here to the extent that several appendices summarizing data on artifact and raw material occurrence and site size were omitted from the present work, but are on file at the Glenn A. Black Laboratory of Archaeology, Bloomington, Indiana. Conversely, it has been somewhat lengthened by the incorporation of material from a paper which I presented at the forty-second annual meeting of the Society for American Archaeology in New Orleans.

A grant-in-aid from Indiana University provided support for the study of the

Hopewell collections at major museums, institutions, and in private collections. For allowing me to work with their records and materials, and for discussing Hopewell with me, I would like to thank especially Walter Klippel, curator of anthropology, Illinois State Museum; Martha Potter Otto, head, Department of Archaeology, Ohio Historical Society; Olaf Prufer, professor of anthropology, Kent State University; James B. Griffin, director emeritus of the Museum of Anthropology, University of Michigan; James Van Stone, curator of North American ethnology and archaeology, Field Museum of Natural History, Chicago; Weldon Frankforter, director of the Grand Rapids (Michigan) Public Museum; Donald Champion, Tell City, Indiana; and Denzil Stephens, Robinson, Illinois. I would also like to thank the many friends and colleagues who, through conversations and correspondence, have also contributed to the completion of this study.

To James H. Kellar, professor of anthropology and director of the Glenn A. Black Laboratory of Archaeology, who directed my research, goes my special appreciation. I am grateful for his interest and assistance in this undertaking. The comments and criticisms of Patrick J. Munson and Robert B. Meier are also gratefully acknowledged. I would also like to thank Donald Whitehead, professor of biology, Indiana University.

Finally, I would like to especially thank my wife, Linda, for her support and consideration.

MARK F. SEEMAN

INTRODUCTION

Widespread interregional trade and elaborate mortuary ritual characterize the Hopewell horizon present in the eastern United States during the Middle Woodland period (200 B.C.-A.D. 400). The Hopewell phenomenon is seen currently by many archaeologists as a series of "interaction spheres," a view most recently and explicitly stated by Struever and Houart (1972). The present work addresses two questions that bear on the usefulness of interaction sphere theory as it has been applied to the Hopewell data. First, there is the question of exactly what kind of interregional trade is represented. Second, there is the question of the structural complexity of the cultural system responsible for this widespread trade. Struever and Houart's work has led them to rather specific conclusions regarding both of these questions. They conclude that (Struever and Houart 1972, pp. 74-77 and figures on pp. 65, 53, 62):

1. clearly recognizable patterns of Hopewell interregional trade existed in specific commodities, and that these can be documented using stylistic and distributional information, and;
2. trade took place within a regularly spaced, hierarchically ordered structure of transactional centers.

The data presentation and methodology in Struever and Houart's work are quite informal. The authors recognize this fact and call for a more rigorous, quantitatively oriented study to test the validity of their conclusions (Struever and Houart 1972, pp. 71, 75).

In addition to assessing the validity of the specific conclusions listed above, this study is also addressed to the more general issue of the usefulness of the interaction sphere concept in analyzing prehistoric data. That is, since the interaction sphere concept has been applied to a variety of other prehistoric contexts—Olmec, Chavin, the Battle Ax Culture, and Maya, for example—it is anticipated that the results of this study may also be of some importance in gaining a better understanding of these cultural complexes. Thus, while the data used in this investigation are drawn entirely from Hopewell sites in the eastern United States, the context in which the interaction sphere theory is most clearly worked out, there is also a commitment to the broader problem—the power of the concept itself for archaeological explanation.

From a methodological standpoint, the present study is structured so that the two important conclusions of Struever and Houart listed above will serve as the principal hypotheses to be tested. The procedure that will be used to test them will involve six major stages. Each is designed to make use of information presented in a preceding section so that arguments can be built in a step-wise progression. First, a summary of the major theoretical developments leading to the formulation of the interaction sphere concept will be presented. The purpose of this summary is to place the development of this theory, which seeks to explain the origin, maintenance, and demise of Hopewell, in proper historical perspective. The point will be made that the addition of new data over the years has contributed to a definite tendency to view Hopewell as an increasingly complex cultural phenomenon; that more sites imply an increased interdependence and interaction among sites. Struever and Houart's formulation represents the present culmination of this trend.

The second stage of this study involves a careful examination of Struever and Houart's view of the Hopewell interaction sphere as stated in their 1972 article. Initially, the important facets of their argument will be summarized. The specific methods that will be used to test the validity of the authors' conclusions regarding both the nature of Hopewell interregional trade and the structure of the system within which it took place will then be discussed in some detail. Testing will involve four principal steps.

In order to test the two hypotheses that are the central concern of this study, it is necessary initially to delineate a research universe. The research universe of the present study will include all of the major Middle Woodland regional traditions in the eastern United States and will emphasize the distribution of mortuary sites and materials associated with mortuary sites within this area. Data have been obtained from a variety of sources, including the published literature, unpublished notes and manuscripts, personal communications, and museum collections. The majority of this information has been encoded in a format that will facilitate rapid manipulation and analysis using a computer.

The next step in this study will involve a careful examination of both the availability and archaeological distribution of major raw materials traded through the interaction sphere. Emphasis will be placed on locating potential source areas, determining the relative importance of materials in interregional trade by constructing an index based on the frequency and range of these materials, and on documenting patterns of statistical correlation among raw materials with interregional distributions. The results will be compared with those of Struever and Houart and similarities and differences will be discussed.

After an investigation of the availability and archaeological distribution of the major raw materials traded through the interaction sphere has been completed, a stylistic and distributional analysis of the artifacts made of these materials will be undertaken. Emphasis will be placed on determining which of these were traded as finished artifacts rather than as raw materials, on analyzing the distribution and density of these artifacts in order to identify particular areas of concentration or "manufacturing centers," and on determining if these artifacts exhibit statistically correlated interregional distributions. The results will then be compared with those of Struever and Houart in order to determine how closely the present study serves to verify the specific and general patterns outlined in their conclusions on interregional trade.

The two sections of this analysis on raw materials and finished artifacts, as outlined above, are designed to test the validity of Struever and Houart's conclusion that clearly recognizable patterns of Hopewell interregional trade existed in specific commodities and that these can be documented using stylistic and distributional information. The final section of this study, however, will seek to evaluate the second of Struever and Houart's conclusions listed above—that trade took place within a regularly spaced, hierarchically ordered system of transactional centers. It is clear that this was the most important conclusion of Struever and Houart's research and constitutes the central concern of their entire study. It is also the most important part of the present analysis. Incorporating material that will be presented in earlier sections of this study on the distribution of interaction sphere raw materials, finished artifacts, and site size, this section of the present study will seek to construct a typology of site complexity using principles derived from central-place theory. Care will be taken to emphasize those criteria which Struever and Houart have noted were of particular importance in constructing their typology. The results will then be compared with those of Struever and Houart. Any differences or deviations from their original conclusions will be discussed within the theoretical framework of central-place theory.

As briefly discussed above, the particular problems that will be addressed in this study relate primarily to the analysis of the spatial distribution of prehistoric material. Although distributional studies have a long tradition in cultural anthropology (Driver 1970), there has been until very recently a certain reluctance to pursue this line of research in archaeology. Perhaps part of this recent reluctance may be a reaction against the obvious inadequacies of the "trait list" approach of the 1940s and 1950s. Another may be the increased emphasis on intraregional study in archaeology (Binford 1964). Finally, the data base changes much more rapidly in archaeology than in cultural anthropology; types and phases are defined at a dizzying pace. Any broad distributional study is bound to be out-of-date before it is in print. Nevertheless, it is argued that distributional studies have in the past and will continue in the future to fulfill an important role in the development of American archaeology. They serve to synthesize the data in the broader context, thus establishing a new base line for comparison and generalization. Such a synthesis has never been available for Hopewell. It is hoped that the present study will contribute to a better understanding of the location and quantities of particular Hopewell materials and will provide a clearer picture of the structural system in which interregional trade took place.

I

THE DEVELOPMENT OF THE INTERACTION SPHERE CONCEPT

The first step in approaching the interaction sphere concept is to place it in its proper historical perspective. The primary point that will be made is that the addition of new data over the years has contributed to a definite tendency to view Hopewell as an increasingly complex cultural phenomenon; that more sites imply an increased interdependence and interaction among sites. Struever and Houart's (1972) formulation represents the present culmination of this trend.

An interest in the "Mound Builders" has a considerable history among the European population of what is now the eastern United States. It is not necessary, however, to the presentation of this thesis to enumerate all of the developments that relate to this rather broad topic, and the reader is referred to several of the excellent studies that summarize a good deal of this material (e.g. Silverberg 1968). Rather, the concern here is with those concepts and ideas that bear directly on the formulation of the interaction sphere interpretation of Hopewell. Viewed from this perspective, there seems little point in tracing the intellectual development of this theory any further back than H. C. Shetrone's work of the 1920s. His most extensive coverage of Hopewell is presented in his book, *The Mound Builders,* which was published in 1930.

The major contribution of Shetrone's work was the definition of a new archaeological complex—the Hopewell Culture. He formally recognized a number of cultural characteristics that sites such as Mound City, Hopewell, Harness, Seip, and Turner shared and that allowed them to be segregated from other archaeological manifestations. Since most of the work at these sites related directly to the excavation of burial mounds, Shetrone's defining criteria emphasized particular burial programs and mortuary offerings.

Although the Hopewell Culture was seen as centered in southcentral Ohio, Shetrone did notice that sites in other areas occasionally produced artifacts similar to those found in the Ohio tumuli (Table 1). The explanation of how certain Hopewell characteristics had come to be present in a few widely dispersed and isolated sites in Illinois, Iowa, Wisconsin, Michigan, and Florida, however, posed a particularly difficult problem. Shetrone's explanations alternate in specific contexts between direct conquest and cultural diffusion from the Ohio center, but he seems to have lent greatest support to the idea of direct conquest. In reference to the Grand Rapids mounds he suggested that the "several earthen pots and other artifacts of Hopewell type taken from some of these mounds, excavated prior to 1875, indicate a very marked Hopewell influence, if not the actual presence in considerable numbers of the living exponents of that rich and complex culture" (Shetrone 1930, p. 280). Regarding the Wisconsin material, Shetrone (1930, pp. 304, 305-306) only suggested that the Flucke, Sioux Coulee, and White groups show ". . . close affinities with the typical Hopewell," yet in reference to the Nicholls Mound he argued that the artifacts indicate direct Hopewell occupancy at the site. Shetrone (1930, p. 322) emphasized that "the most striking development of the Hopewell culture in Illinois, however, is found in the vicinity of Havana and Lewistown, in Fulton County," and made special reference to the Ogden-Fettie, Montezuma, Havana, and Naples groups. In the last of these he noticed that both Hopewell and non-Hopewell artifacts were often incorporated in the same burial mound and suggested as an explanation ". . . either the presence of two cultures or decided modification through contact of cultures" (Shetrone 1930, p. 324). Shetrone was more vague in his explanation of the existence of Murphy Island and Crystal River, the only sites in the Southeast viewed at the time as relating to Hopewell. He merely noted that these sites show either a ". . . relationship to or contact with the Hopewell culture . . ." (Shetrone 1930, p. 456).

TABLE 1. NUMBER OF HOPEWELL MORTUARY SITES RECOGNIZED WITHIN DIFFERENT CULTURAL REGIONS BY FIVE-YEAR PERIODS

	1930-34	1935-39	1940-44	1945-49	1950-54	1955-59	1960-64	1965-69	1970-75	Total
Scioto	6	–	3	2	–	1	14	2	10	38
Point Peninsula	–	2	2	–	6	1	1	8	1	21
Havana (Ill.)	22	3	15	2	3	4	3	27	19	98
Crab Orchard	–	–	–	1	2	1	1	1	2	8
Southern Appalachian	–	7	4	2	3	–	–	1	14	31
Miller-Porter	–	–	2	–	2	–	–	2	2	8
Marksville	4	1	1	–	1	–	1	3	6	17
Santa Rosa-Swift Creek	2	–	–	16	–	–	1	1	–	20
	34	13	27	23	17	7	21	45	54	241

Although he did not discuss the question of origin, it is clear from his writings that Shetrone viewed Hopewell as originating in and primarily confined to Ohio. Those few sites in other "subareas" were seen as resulting from some contact with Hopewell peoples, or more probably, direct conquest.

The next major work on Hopewell, Frank Setzler's (1933) summary of the Marksville material, quickly provided an alternative to Shetrone's interpretation. Setzler, working with ceramics excavated near Marksville, Louisiana, noticed the similarity of this material to pottery recovered from northern Hopewell sites. His detailed comparison of these assemblages led him to rule out the possibility of independent invention. Rather, to explain these similarities Setzler put forth two hypotheses. First, he noted that Hopewell pottery techniques could have originated in the North and subsequently been carried south, either by direct contact with northern Hopewell groups or via indirect trade connections (Setzler

1933, p. 6). As support for this hypothesis, Setzler (1933, p. 6) stated that there were a number of materials present in northern Hopewell mounds that suggested interaction with the Southeast—specifically, barracuda jaws and tortoise shells. The implication is that certain Gulf Coast products were being secured by northern Hopewell groups and that as a consequence of this contact southern groups received northern Hopewell pottery, both in the form of finished products and as decorative concepts. Alternatively, Setzler (1933, p. 6) suggested that northern Hopewell culture could have originated in the Southeast and subsequently expanded or migrated northward. It is clear that Setzler favored this latter hypothesis, and he presented several arguments to support his position. First, he noted that if Hopewell ceramic techniques were derived from the South, it should be expected that another type of pottery would be found in northern sites—something quite different from Hopewell ware and that had been in use prior to the intrusion from the south (Setzler 1933, p. 6). He noted that unfortunately there was at the time no available evidence that would support or refute this particular point. However, subsequent work has lent some additional support to Setzler's argument; particularly important here is the fact that an indigenous Havana ceramic tradition has been demonstrated to have preceded the introduction of Hopewell ware at a number of northern Middle Woodland sites.

Setzler himself, however, viewed a second line of reasoning as a more important source of support for his interpretation. He noted that the ceramics from Marksville sites were simpler, more elemental, and hence ancestral to the more elaborate Hopewell pottery of the North (Setzler 1933, p. 7). Further, he argued that there was a much greater degree of similarity between Marksville ceramics and other types recognized in the Southeast than he saw between Hopewell pottery and other ceramic material found in the North (Setzler 1933, pp. 6, 21). This is essentially an "age-area" explanation (Wissler 1926). It should be noted in regard to the latter argument that a good deal of the similarity Setzler saw between Marksville and other ceramic types resulted from the fact that he placed several Mississippian assemblages in his Marksville type, thereby increasing the apparent similarity between Marksville and other local cultural complexes.

Thus, Setzler presents Hopewell as something quite different than Shetrone had suggested only three years previously. Setzler's detailed comparison of ceramic attributes suggested to him that various Hopewell assemblages in the eastern United States were similar, but exhibited differences, and that these differences were not of the type to be expected if various groups were colonies or trading directly with the Ohio centers. Rather, Setzler suggested that these kinds of differences would more probably result if the various Hopewell manifestations were not interacting directly, but had developed from a common source, presumably in the Southeast.

The late 1930s and early 1940s marked a period when a large number of new Hopewell sites were being excavated or recognized in the eastern United States (Table 1). Particularly important here are Fay-Cooper Cole and Thorne Deuel's (1937) work in Illinois which for the first time focused on habitation sites as well as burial structures, Quimby's (1941) recognition of the Goodall focus in Michigan and Indiana, and Webb's (1939) excavations in the Tennessee Valley that led to the definition of the Copena focus. The addition of so many new sites and complexes, especially viewed in the context of the McKern taxonomic approach, stimulated a more complex interpretation of regional relationships. By comparing trait lists it became clear that many of these complexes shared a number of different traits with Ohio Hopewell. This forced a major modification of Setzler's somewhat simplistic historical explanation for widespread Hopewell similarities to a position holding that Ohio Hopewell resulted from the blending or synthesis of a diversity of cultural traits derived from a number of contributing areas. This interpretation is summarized quite well in a statement by Griffin (1943, p. 307):

> There is, however, in the Hopewell Aspect of Ohio a truly extraordinary cultural aggregate, which has cultural associations with groups in the South, such as Copena, the Crystal River Focus in Florida, and with the Marksville Focus in the lower Mississippi Valley. The Hopewell culture in the North must then be the result of an amalgamation of cultural influences from virtually the whole eastern United States, unless it is conceived that these outlying "trading-posts" are the result of different groups of people emigrating from the Ohio area with little blocks of Hopewell culture and setting up a new division centered around these.

The publication in 1952 of *Hopewellian Communities in Illinois,* edited by Thorne Deuel, marked the next major theoretical reorganization of the Hopewell data. This volume, in addition to presenting a number of new site reports from the Illinois area representing both mounds and habitation sites and a formal definition of many Middle Woodland pottery types, also contained an important summary article by the editor (Deuel 1952). In contrast to many of the authors of the previous decade, Deuel rejected ancestral development *per se* as a viable explanation for the similarities that existed among Hopewellian groups across much of the eastern United States. Rather, he held the position that these similarities resulted from the fact that contemporaneous peoples across several geographic areas were interconnected or mutually tied to one another through bonds of trade and genealogy, thus forming a loosely knit, widespread Hopewellian community. For example, he notes (Deuel 1952, p. 256):

> It seems to us, at this distance in time, unlikely that this central North American territory was under a single ruling body even in a loose confederation. Nevertheless, there must have been a strong bond of sympathy and cooperation, for across most of this territory trade was active in raw materials from which insignia, ornaments, and objects of wealth were fashioned.

While Deuel saw this community as primarily bound together by ties of trade, co-operation, and so forth, he did feel that Hopewell originated in Ohio and was generated by the transition to an agricultural subsistence base. He suggested that food production provided additional "leisure time," which was in turn channeled toward an increased emphasis on spiritual expression. The latter required a formal priesthood and regular ceremonies (Deuel 1952, pp. 254, 264). It is quite obvious that Deuel was attempting to apply a theory of culture change developed by Old World archaeologists to the North American situation (see, for example, Braidwood and Braidwood 1950, p. 189; Childe 1951, p. 61).

The mechanism whereby the Hopewell Culture of Ohio was spread to adjacent areas was viewed by Deuel (1952, p. 255) primarily as the result of colonization:

> Among the surrounding ruder tribes with hunting or simple hoe-culture economy, it was not difficult for aggressive intelligent members of the faithful to establish first their Hopewellian religion and its rites and next their political authority from the mother community . . . . Once established in a new community, the newcomers may have imported artisans or developed them from the natives among whom they settled.

Thus, Deuel suggested the presence in most Hopewell groups of at least two classes—ruling colonists and indigenous commoners. He supported this position by noting the presence of different burial programs in several areas; burial mounds were thought to be reserved for the ruling class while the commoners were relegated to less pretentious cemeteries (Deuel 1952, pp. 255-56).

In addition to his emphasis on colonization between societies, Deuel also stressed that within each major Hopewellian area there were smaller sovereign political units, each of which included one or more important villages and a number of lesser hamlets. The latter were definitely under the control of the larger units and were periodically called upon to contribute resources and energy to insure the successful completion of seasonal ceremonies held at the larger sites (Deuel 1952, pp. 256-57). This particular view of intrasocietal organization becomes of considerable importance in the thinking of subsequent researchers.

In retrospect, it is evident that many of Deuel's conclusions regarding the nature of Hopewell were overly general and often not adequately supported with actual data. His arguments were often qualified with "it may be surmised," "it is possible," "perhaps," and so forth. Nevertheless, by focusing on trade and conquest rather than vague historical ties, Deuel's work marks a shift in orientation that can be seen as continuing in the work of Caldwell, Struever, and others.

In the mid-1950s while Deuel was still director of the Illinois State Museum, Joseph Caldwell joined the staff as curator of anthropology. He shared Deuel's interest in Hopewell. Caldwell's 1964 article, "Interaction Spheres in Prehistory," was his major theoretical contribution on the topic. Building on many of the concepts developed by Deuel and incorporating ideas formulated by anthropologists working in other geographic areas (e.g. Redfield 1941; Sanders 1956; Willey 1962), Caldwell formalized and defined many of the interregional similarities that had previously been recognized and tied them together within the conceptual framework of what he called the "Hopewell interaction sphere."

Caldwell's interaction sphere concept was meant to denote those cultural situations where several distinct, regionally tied societies, each with its own historical tradition and specific ecological adaptation, were also participating in an exchange of ideas and experiences on an interregional level. This "cross-fertilization," he maintained, increased the opportunities for innovation and often resulted in what we call civilization. Caldwell (1964, p. 141) pointed out that his argument was not tied specifically to Hopewell, but rather that interaction spheres have existed and stimulated cultural evolution in many areas of the world; for example, the Megolithic religion and Battle Ax Culture in prehistoric Europe, Chavin in South America, Olmec in Mesoamerica, and the Midewin Cult and Ghost Dance in North America. Caldwell (1964, pp. 137, 140) noted that most interaction sphere connections appear primarily in mortuary-religious matters and suggested Willey's hypothesis that religion is a fundamental organizing principle in the rise of civilization was quite consistent with his own position.

Applying this directly to the Hopewell data, Caldwell emphasized the secular differences among regions and the homogeneity of the panregional mortuary practices. The recognition of secular diversity hinged (as it often does) on the distribution of pottery types. Mentioned specifically are the Havana, Adena-Scioto, Crab Orchard, Southern Appalachian, Gulf, and Northeastern regional traditions. All were correlated with particular ecological areas and showed their own regionally specific pattern of historical development (Caldwell 1964, pp. 137-38, 140).

Regarding the sacred, Caldwell noted the prevalence of particular design elements and nonutilitarian artifact types in Hopewell mortuary contexts throughout the East. He illustrated this by pointing to specific examples such as the resemblance of certain figurines found in Georgia and Illinois and the presence of panpipes as mortuary offerings at sites in Illinois, Ohio, Georgia, and Florida (Caldwell 1964, p. 137). Particular artifact types and burial practices were viewed as having been invented within various regional traditions and their panregional distribution during the Middle Woodland period was seen largely as a result of the ideological exchange that took place within the framework of the Hopewell interaction sphere (Caldwell 1964, p. 138). Importantly, Caldwell did not mention trade *per se*, either in raw materials or in finished products as central to the interaction sphere; rather, his arguments were presented in terms of ideological exchange and innovation.

In the same volume that Caldwell's theory first appeared, Stuart Struever published an article entitled "The Hopewell Interaction Sphere in Riverine-Western Great Lakes Culture History." While Caldwell was primarily concerned with the general question of how the existence of interaction spheres stimulated cultural change, Struever was more concerned with explaining *why* this interaction sphere developed and was participated in by a number of regional traditions. He argued that the answer lies in the adoption of new forms of social organization across several regions that were in turn stimulated by the population increases that resulted from experimental efforts in food production. Thus, Struever's work tended to place the interaction sphere back into a more direct relationship with particular subsistence practices than Caldwell's original position would have suggested.

There are two major aspects of Struever's hypothesis that deserve closer attention here. The first of these is his presentation of the Hopewell interaction sphere in economic rather than ideological terms. Thus, while Caldwell made somewhat vague references to innovation and intellectual stimulation as the basis for Hopewell interaction, Struever's economic interpretation placed emphasis on the circulation within a formal logistics network of artifact styles, raw materials, and especially finished products, together with the cultural rationale for the use of these goods (Struever 1964, p. 88). This rationale, Struever noted, was not tied uniquely to mortuary practices, but also related to a variety of other areas of community religious and social life. He did not elaborate on the specific functions of these items beyond noting that they were "status-specific objects" (Struever 1964, p. 88; see also Binford 1962). In this article we also find the term itself gaining additional formality—Interaction Sphere is now capitalized.

In addition to emphasizing the economic nature of interregional interaction, Struever was also concerned with explaining why Middle Woodland groups would begin to participate in this network in the first place. He noted that tracing various widespread Hopewell practices to particular ancestral regions, something several of his colleagues had attempted, does not explain why the Interaction Sphere developed.

Struever's attempt to gain insight into this process relied heavily on the examination and comparison of settlement pattern distributions in the Great Lakes-Riverine area. More specifically, he attempted to identify settlement-subsistence patterns for pre-Hopewell Woodland groups and Hopewell populations in both the Havana and Crab Orchard regions in order to study any changes that might have correlated with participation in the Interaction Sphere. Briefly, his findings indicated that in both areas there appears to have been a desertion of "hinterland" secondary valleys and a corresponding increase in both the size and density of habitation sites in the major river valleys, an increase in the homogeneity of mortuary site structure and burial program within the region, and a strong correlation between concentrations of habitation sites and the presence of Hopewell ware, Interaction Sphere raw materials, and finished products. The inference then is that in particular areas population increases fostered an increased participation in the Interaction Sphere. The "prime mover" behind these population increases, Struever suggested, was the adoption of mud-flat horticulture, a natural outgrowth of "primary forest efficiency" (Caldwell 1958) in environmentally lush areas. The cultural "payoff" resulting from an increased participation in the Hopewell Interaction Sphere is unclear, but Struever (1964, pp. 103-104) implies that perhaps this reflects a shift to a higher level of sociocultural complexity.

Once Struever had established what he felt were the basic processes that led to the development of the Interaction Sphere, he turned his attention to a more specific analysis of the actual mechanics and operation of the system. His results were published in 1972 in an article coauthored with Gail Houart entitled "An Analysis of the Hopewell Interaction Sphere." The article describes in considerable detail the particular patterns of trade that were established by Middle Woodland groups both within and between regions. The Struever and Houart concept of the Interaction Sphere is one of an economic system of complex and hierarchical organization. It is a logical development out of the ideas presented in Struever's earlier work, but with additional attention to quantification, both in terms of defining patterns of exchange and analyzing site distribution and structure. A detailed summary of this particular study together with a strategy for testing the authors' major conclusions will be presented below.

Struever's earlier work served to explain how the Interaction Sphere as a system came about, and the 1972 article described how it operated. Two rather important questions, however, remained unanswered. No one had explained why the Interaction Sphere was maintained; that is, what specific economic advantages did it provide to participating societies? Secondly, although a number of arguments had previously been made to explain the decline of Hopewell about A.D. 400, for example, cultural fatigue (Griffin 1952b), climatic change (Griffin 1960), and warfare (Prufer 1964), no one had addressed this question within the theoretical framework of the Interaction Sphere. Both questions, however, have recently been examined in a paper by Robert Hall (1973) entitled "An Interpretation of the Two-Climax Model of Illinois Prehistory." Here he makes the point that the Interaction Sphere must have provided some concrete benefits to participants. These benefits he sees primarily in the system's contribution to the maintenance of intergroup ties that would be needed from time to time for purposes of survival. Hall (1973, pp. 12, 58-59, 65) notes that the circulation of raw materials, artifacts, and other goods such as tobacco would insure that bonds of friendship and mutual obligation remained open so that in times of regional surplus or scarcity in subsistence goods an efficient mechanism was present to insure the redistribution of food. This interpretation, although not directly testable, makes a certain amount of anthropological sense, especially in light of such well-known trading systems as the Kula ring of Melanesia, the Northwest Coast potlatch, and the Pomo trade feast.

Hall also provides a solution to the question of why the Interaction Sphere disintegrated. He suggests that it was brought to an end by an increased ability of cultural units to provide for their own subsistence needs in a more predictable manner, thereby making it economically unnecessary to participate in an Interaction Sphere "insurance" network. The introduction of the bow and arrow and more efficient forms of agriculture are seen as important stimuli in this transition (Hall 1973, p. 69). Thus, with the addition of Hall's paper the Interaction Sphere provides a theoretical framework for explaining most of the facets of the Hopewell data. Explicit hypotheses have been put forth as to why it began, how it operated, why it operated, and why it ended.

In re-examining some of the major theoretical works that have led to the current interpretation, it is suggested that there has been an increased tendency to view Hopewell sites and complexes as comprising a closely integrated system centering on interregional trade. The current picture is one of a highly complex trading system existing among cultural units with different adaptations, but at roughly equivalent levels of cultural development. This trend is no doubt to a certain extent the result of changing theoretical paradigms within the discipline, but it also seems to reflect a tendency to formulate increasingly sophisticated explanations of the relationships between Hopewell sites as more and more sites are discovered.

II

THE STRUEVER AND HOUART ANALYSIS OF THE HOPEWELL INTERACTION SPHERE

What follows now is an examination in detail of Stuart Struever and Gail Houart's view of the Hopewell Interaction Sphere as stated in their 1972 article. Initially, the important facets of their argument will be summarized. The methodology that will be used in subsequent portions of this study to test the validity of these authors' conclusions regarding both the nature of Hopewell interregional trade and the structure of the system within which it took place will then be discussed.

The Struever-Houart Model

Struever and Houart have presented their analysis in five major sections. The first of these is concerned with providing a definition of the Hopewell Interaction Sphere. Here they argue that the Hopewell Interaction Sphere should be viewed as a series of transactional systems whereby local Middle Woodland groups obtained exotic raw materials, finished artifacts, and ideological concepts (Struever and Houart 1972, pp. 48-49). They are particularly careful to make the distinction between Hopewell and the various "regional traditions" which it transects. Hopewell is viewed as pertaining to the communication of status and prestige across a number of distinct Middle Woodland cultural complexes and can be recognized by the presence of Interaction Sphere exotica. Regional traditions, on the other hand, represent contemporaneous, but distinct, archaeological expressions that can be recognized on the basis of the distribution of stylistic variation in artifact types associated with subsistence activities, specifically projectile points and utilitarian pottery (pp. 49-50). Another important concept introduced in this section is the assumption that Hopewell sites can be considered to be contemporaneous. This in turn allows the authors to argue that intersite variation formerly attributed to temporal differences was in fact the result of functional differences within the hierarchy of Interaction Sphere sites. This assumption also contributes to viewing the Hopewell Interaction Sphere as a considerably more vital system by increasing the number of sites involved at a given time to the maximum. Support for this assumption relies heavily on contesting the validity of the chronological sequence suggested by Prufer for the major Ohio Hopewell sites (pp. 50-51).

The second section of the Struever–Houart analysis provides a definition of "regional transaction center." The regional transaction centers functioned both as the loci of transactions serving to integrate small-scale sociopolitical units in an intraregional network and as nodes controlling interregional transactions between regional elites in the larger mid-continental area (pp. 52, 74). Sites of this type were spaced at regular intervals across the Midwest and occupied positions that allowed them to control key routes of communication (pp. 52-53, 56).

The specific criteria utilized to identify regional transaction centers include size, complexity, and the quantity and diversity of Interaction Sphere products (p. 52). The particular sites included in this category are Hopewell, Newark, Marietta, Portsmouth, Cincinnati, Mann, Twenhofel, North, Golden Eagle, Ogden-Fettie, Albany, and Trempealeau (p. 53).

The third portion of Struever and Houart's study examines what the authors refer to as the "interlocal network." The interlocal network is composed of a regional transaction center and those sites of lesser complexity associated with it (pp. 60-61). To illustrate this concept, Struever and Houart discuss the structural relationship among those sites located in the lower Illinois Valley and associated with the Golden Eagle regional transaction center. They identify three additional types of sites which relate in hierarchical fashion to the regional transaction center: the local transaction center, the talus slope settlement, and the bluff crest cemetery.

Local transaction centers are viewed as the focal points of economic and ritual activities which functioned to distribute Hopewell Interaction Sphere goods among the various associated local communities (p. 61). They are one level below the regional transaction center in the network hierarchy. Particular criteria allowing the identification of local transaction centers include their location on the floodplain, the presence of loaf-shaped burial mounds, the immediate proximity of a habitation site, and the quantity and diversity of Hopewell Interaction Sphere artifacts present (pp. 61, 63). It is also suggested that they are relatively evenly spaced up the valley, with an average distance between them of about twelve miles (p. 61). Sites initially discussed as members of this type include Merrigan, Kamp, Mound House, Naples-Chambers, Hilderbrand, and Baehr (p. 61). Six additional sites are later discussed as probable local transaction centers and are labeled as such on Struever and Houart's distributional map of the lower Illinois Valley (p. 62). They differ from the first group of sites in having circular or oval mounds rather than loaf-shaped ones (p. 63). Two of these sites, Peisker and Collins, are identified in the study, but the other four are not.

The remaining two levels of the interlocal network, the talus slope settlement and the bluff crest cemetery, are not discussed in any detail by Struever and Houart. Criteria for identifying these types are not clearly delineated, although obviously physiographic association is important in each case. Only a few talus slope settlements and bluff top cemeteries are clearly identified, but it is obvious from Figure 4 in Struever and Houart's study that they feel there are a great many more sites of these types than there are local or regional transaction centers (p. 65). The four levels in this typology do in fact appear to form a branching hierarchy with an ever-increasing number of sites associated with lower levels of the network.

The fourth section of Struever and Houart's analysis discusses the presence of concentrating areas for particular Interaction Sphere raw materials. The availability of what the authors consider the major Interaction Sphere raw materials is examined, and they provide a map documenting the potential source areas (p. 67). They then suggest that particular sites served as "concentrating areas" for some of these materials because of geographic or social factors. On the basis of such criteria as the quantity of material recovered, the presence of manufacturing debris, and the number and variety of artifacts made from a given material, the authors suggest that particular concentrating areas can be identified (pp. 66, 68). Hopewell and Trempealeau are singled out as examples of this type of site by Struever and Houart. They argue that Hopewell was a major concentrating area for copper, silver, obsidian, grizzly bear canines, and Michigan hematite. Trempealeau is viewed as a concentrating area for copper and silver which was subsequently traded to the central Illinois Valley (p. 68).

The fifth section of Struever and Houart's study examines the transactional relationship among the Ohio centers. They state (p. 68) that this portion of their investigation involves the analysis of:

1. exotic raw materials with specific, designatable source locations;
2. styles of artifacts made from these raw materials;
3. unaltered raw materials, preforms and debris, all of which reflects the manufacturing process; and
4. the spatial distribution of all of these among six Ohio Middle Woodland local and regional transaction centers.

These data are then used to develop models of transactional relationships among the Ohio sites (p. 69). The basic approach is diffusionistic. It is assumed that particular raw materials and artifact types will be found in greater densities and in a greater variety of forms at the site where they enter the Interaction Sphere. On these bases, it is suggested that the Hopewell site was the center for the manufacture of artifacts made of obsidian, quartz, mica, copper, and grizzly bear canines in the Ohio region (pp. 69, 71-72). Similarly, Mound City is viewed as the center for the manufacture of galena artifacts, effigy platform pipes of Ohio pipestone, and the importation and initial shaping of mica plates (p. 69). Due to the variety of styles and the quantity present, it is also suggested that Tremper was the major center for the manufacture of plain platform pipes (pp. 69-71). The authors hypothesize that these and other local specialties were exchanged among the various Ohio sites via a complex network of reciprocal relationships.

In the final section of their study, Struever and Houart describe interregional networks of interaction. They are specifically interested in examining trade between Ohio and Illinois. The evidence used to support their interpretations are of the same type as those used in the previous section, hence are diffusionistic in character. In this section it is suggested that effigy platform pipes, plain platform pipes, pipestone, bicymbal earspools, copper axes, mica sheets, grizzly bear canine ornaments, Flint Ridge flint bladelets, obsidian, and panpipes were traded from Ohio to Illinois (pp. 74-75). It is argued that in return "classic" Hopewell figurines, Hopewell ware pottery, pulley-type pottery earspools, and pearls were traded in the opposite direction (pp. 74-75). It should be noted, however, that in a later section of the study, the authors suggest that "classic" figurines were not produced in the Illinois Valley, but rather at the Mann Site in southern Indiana (p. 77). Struever and Houart also note that hornstone artifacts were imported into Ohio from the Crab Orchard area of southern Illinois and Indiana (p. 74). The authors make it clear that the interregional network which they describe for Ohio and Illinois is simply an example and that there are a number of other such networks existing between different regions lying in the Interaction Sphere.

Thus, the Struever and Houart analysis of the Hopewell Interaction Sphere can be seen as both an attempt to describe the structural system within which trade took place and to characterize the type of exchange that took place within this network of sites. Specifically regarding interregional trade, it can be seen that Struever and Houart conclude that trade took place within a regularly spaced, hierarchically ordered structure of transactional centers. Further, they conclude that there are clearly recognizable patterns of trade among these centers in specific commodities and that these can be documented using stylistic and distributional information. The authors do state, however, that their study should only be considered a preliminary analysis and call for additional, more quantitatively based testing of their conclusions (pp. 71, 75, 79). The remaining portion of this chapter will discuss a methodology designed to accomplish this goal.

TESTING THE STRUEVER-HOUART MODEL

Defining a Research Universe

The first step in the evaluation of Struever and Houart's model of interregional trade involves the definition of a research universe. Struever and Houart's analysis was limited to the study of Hopewell in the Great Lakes-Riverine area of the Midwest. They divided this area into three major regions—Havana, Crab Orchard, and Scioto. These then served as their basic units of comparison. For purposes of this study, however, I wish to expand the scope of the analysis to include all of the Middle Woodland regions in the eastern United States that are known to have participated in the Interaction Sphere. Hopewell material has, of course, been found from Ontario to Florida, and from New York to Nebraska—not just in the Great Lakes-Riverine area. By expanding the study to include these other areas, some of the biases that lead to overly particularistic explanations will be minimized.

The expanded scope of the present analysis requires that a number of Middle Woodland regional traditions be defined in those areas outside of the Great Lakes-Riverine territory. The criteria used to define these regions, however, will be exactly the same as those suggested by Struever and Houart—that is, stylistic variation in subsistence-related artifact types. In practice, this will depend overwhelmingly on variation in pottery styles.

Within these regions, the site will be the basic unit of data collection. This also parallels the approach used by Struever and Houart for the data they collected in the Great Lakes-Riverine area. One important difference, however, is that although these authors included data in their study derived from both mortuary and habitation sites, the present analysis will make use of only information pertaining to Hopewell mortuary sites.

Literally thousands of sites with Middle Woodland components can be found across the vast territory where people formerly participated in the Hopewell Interaction Sphere. This necessarily forces the implementation of some form of sampling strategy. Consequently, it was decided that the least biased results for the examination of Hopewell trade and structural complexity would be obtained by incorporating only data that related directly to mound groups. Several lines of reasoning entered into the decision to emphasize this type of information.

The construction of burial mounds is a major unifying theme of Hopewell in the eastern United States. Burial mounds are assumed to have been constructed everywhere that the Interaction Sphere was in operation, and indeed it appears that many of the specific Interaction Sphere commodities are found in their densest concentrations in these contexts. Also, a great number of mounds, in contrast to village sites, have been excavated over the past two centuries, and it is assumed that at this point they are a more accurate indicator of local prehistoric activity. It is assumed that mound groups were associated with the major Middle Woodland habitation sites of peoples participating in the Interaction Sphere, hence the distributional pattern of mortuary sites is reflective of the distribution of major villages or base camps. There is some empirical support for this position (Struever 1964, pp. 99, 103; Prufer 1967, p. 275; Munson and Harn 1971, p. 7; Farnsworth 1973, pp. 23-24). Thus, in emphasizing only mortuary sites, the data base that will be used in this analysis does differ somewhat from that used in Struever and Houart's work. It is argued, however, that a structural analysis of the Hopewell Interaction Sphere cannot be based on both mortuary and habitation sites; this is in a sense mixing apples with oranges—a confusion of two cultural subsystems that should remain distinct. Once the sites to be used in this analysis have been identified, a record will be made of the raw materials present, the artifact types present, and site size, all of which will be used for purposes of interregional comparison.

Interaction Sphere Raw Materials and Interregional Trade

Once the research universe has been established, there follows the examination both of the availability and archaeological distribution of the major raw materials that were traded through the Hopewell Interaction Sphere. Struever and Houart have suggested that interregional trade had to take place either in exotic raw materials and certain stylistic concepts or in finished artifacts. It is quite clear from their work that they are strongly committed to the latter position. However, they do discuss the availability of raw materials in some detail. According to their model, each of these materials was accessible in relatively few locations. Struever and Houart have suggested that once these raw materials were collected, they were brought to "concentrating areas" from which they were subsequently shipped throughout the Interaction Sphere, usually in the form of finished artifacts.

The first step in this part of the analysis will be to investigate further the availability of these materials. It will be concerned with documenting both the natural occurrence and the evidence for aboriginal exploitation (e.g. quarry pits, association of workshops, ethnographic accounts) of Interaction Sphere raw materials. These results will then be compared with those of Struever and Houart, and the similarities and differences will be discussed.

The second step will be to investigate the relative importance of particular raw materials in interregional trade. Struever and Houart document a number of materials which they feel were traded through the Interaction Sphere, but do not provide any information that would allow the reader to determine whether they are of relatively equal importance in interregional trade, or if some materials are vastly more important than others. It is not possible, for example, to determine on the basis of their study whether copper occupies a more important position than barracuda jaws. This type of information will be quite useful in appraising the relative intensity of Interaction Sphere trade, if it is assumed that trade is primarily in raw materials. It will also be useful in determining if materials with particular physical properties, or that are available in particular geographic regions, are more important than others. "Cultural importance" will be measured as a function of the range of a raw material and the frequency of occurrence across this range.

A third step will be to determine the pattern of co-occurrence of Hopewell raw materials in archaeological contexts. If trade took place primarily in raw materials, then it is important to determine if it represents a highly structured, complex system of interregional exchange or if it is largely a capricious, loosely integrated type of trade. It is hypothesized that the more the evidence suggests that various raw materials exhibit correlated distributional patterning on an interregional basis, the greater the likelihood that this is in fact a highly regularized system. The specific method that will be employed to test the strength and pattern of these correlations is factor analysis, a statistical technique designed to reduce the variation exhibited among variables to a smaller set of underlying components.

Factor analysis is essentially an inductive technique that is well suited to searching for patterned relationships within the data. Given an array of correlation coefficients for a set of variables, factor-analytic techniques allow the researcher to see whether some underlying pattern of relationships exists such that the data may be reduced to a smaller set of factors that may be taken as source variables accounting for the observed interrelations in the data. In this study, the interest is in determining if a factor analysis based on the archaeological occurrence of Hopewell Interaction Sphere raw materials will produce factors that reflect patterns of interregional distribution. These then can be used as a basis for delineating particular vectors of trade and in identifying the commodities involved that are important in establishing these patterns. Factor analysis has been widely used in recent archaeological investigations to deal with similar problems (e.g. Ahler 1971; Benfer 1972; Binford 1972; Roper 1974).

Interaction Sphere Artifacts and Interregional Trade

Although Struever and Houart note the possibility that interregional Hopewell trade might have been primarily in raw materials, it is clear that they feel that the vast majority of it was in finished artifacts. They do in fact provide an extensive list of specific artifact classes that appear to have been traded interregionally in the Great Lakes-Riverine area. They also point out both specific manufacturing centers and patterns of exchange for a number of these artifacts.

In order to test this interpretation, it will be necessary initially to delineate those classes of artifacts found in Hopewell contexts that have interregional distributions. Many of these, of course, have been defined in Struever and Houart's analysis. In the event that additional types of interregional distribution are identified during the process of recording the available information on Hopewell mortuary sites, this data will also be included.

A further step involves a stylistic evaluation of each type in order to determine if local or intraregional varieties can be identified. If this type of variation is encountered, the artifacts in question will be assumed to represent interregional trade in raw materials rather than in finished products. As a corollary to this procedure, it is also recognized that certain artifacts can, on stylistic grounds alone, be designated as items of interregional trade, despite the fact that they may be made of potentially locally available, non-Interaction Sphere raw materials. These also will be included in the analysis.

This investigation will then proceed to examine the spatial distribution of each artifact type in order to delineate areas of major concentration which indicate centers of manufacture. Emphasis will be placed on qualitative information, but quantitative information will also be used in cases where it is available. It is anticipated that it may not be possible in all cases to identify manufacturing centers with a high degree of specificity. It may only be possible, for example, to identify general areas or regions where manufacturing is likely to have taken place rather than specific sites. In some cases even this may not be possible. The results will then be compared with those of Struever and Houart.

As a fourth step, the "cultural importance" of particular artifact classes involved in interregional trade will be examined. This provides one means of evaluating the intensity and scope of Hopewell interregional trade in artifacts. "Cultural importance" will be measured as a function of the range of an artifact type and the frequency of its occurrence across this range.

Finally, a factor analysis will be performed on the available distributional information for Hopewell artifact styles and remaining exotic raw materials. The purpose of this is to determine statistically if relationships or patterns exist among these variables that are of an interregional nature. It is anticipated, for example, on the basis of Struever and Houart's work that certain artifact types which have been hypothesized to have been traded within a network of reciprocal relationships will have high loadings on the same factor. Both this stage of the analysis and the one dealing with cultural importance will parallel those presented in an earlier section of this study addressed to the problem of interregional trade in raw materials. The results of these two sections, which make somewhat different assumptions regarding the nature of Hopewell trade, will be compared in the conclusions.

Site Complexity and the Structure of the Interaction Sphere

Although Struever and Houart certainly are concerned with Hopewell trade from the standpoint of describing the nature of trade in specific commodities, the major portion of their study is devoted to a discussion of the hierarchical and complex network of sites within which trade took place. The present study will use a variety of criteria, which will have been introduced in preceding sections to construct a more formal typology of site complexity using principles derived from central-place theory. Care will be taken to emphasize those criteria which Struever and Houart have noted were of particular importance in constructing their typology. These include the number of raw materials present, the number of artifact types present, and site size. The results will then be compared with those of Struever and Houart.

III

REGIONAL TRADITIONS AND THE NETWORK OF SITES

Attention will now be given to defining the various regional traditions that participated in the Hopewell Interaction Sphere. Important in this definition are the establishment of spatial parameters, the characterization of dominant patterns of settlement and subsistence, and the location of particular sites that were involved in interregional trade.

Most previous studies of Hopewell have dealt with fairly restricted geographic and cultural contexts. Even the most inclusive of these do not usually seek to incorporate data beyond the level of the "region" or "regional tradition" (see Willey and Phillips 1958, p. 20 and Caldwell 1958, pp. 1-5 for the original definitions of these terms). The advantages of a "regional approach" in gaining insight into cultural processes are numerous (Binford 1964). However, it is argued that a study of the Hopewell Interaction Sphere, an obviously widespread and interregional phenomenon, should at least in part take place on an interregional level of analysis. Obviously, by expanding the scope of this study less time and attention can be devoted to a variety of details that are important in various local pictures. However, it is necessary to make this compromise in order to sort out some of the important generalizations that relate to Hopewell.

The spatial bounds of individual regional traditions are defined by the distribution of diagnostic ceramic types. There is a strong precedent for this approach (Ritchie 1965, p. 208; Sears 1964, p. 262; Binford 1962, p. 220). The information presented here updates and expands that provided by Griffin's 1967 study.

Despite the fact that regional traditions are defined primarily on the distribution of ceramics, information relating to other facets of regional expression will also be presented in this section, particularly if it relates to settlement or subsistence. This is done in recognition of the fact that it may not be possible to gain any additional insight into the Interaction Sphere problem without at least a basic understanding of the cultural milieu that produced it.

Although the major concern of this study is with interregional comparison, the data necessary to make these comparisons are concentrated within each region at particular sites. Of course, a great number of sites with Middle Woodland components can be identified in each of the major regional traditions under investigation, thus forcing the implementation of some form of sampling strategy. It was decided that the least biased results for interregional comparison would be obtained by incorporating only material that had been excavated from mound groups. (See above, p. 253.)

Two major criteria were used to evaluate the particular mounds included in this study. First, a mound had to be demonstrated to be Middle Woodland. This was determined by the direct association of Hopewell materials, particular burial practices, or in some cases radiocarbon evidence. Mounds cannot be identified as Middle Woodland without excavation (Phillips 1970, p. 880). Second, particular mounds had to be demonstrably associated with the permanent interment of the dead. There are a number of Hopewell mounds which apparently served other functions (e.g. Prufer 1967, p. 288; Struever 1968, p. 298).

In addition to determining the distribution of Hopewell mortuary sites, some measure of the size of the various sites is required for comparative purposes. In the case of habitation sites this is usually determined simply by the spatial limits; for example, the number of square feet, acres, or hectares. For mound groups, however, this method is not adequate. Neither is the number of mounds present at a particular site an accurate measure of site size since mounds show considerable variation in size and structure.

The actual dimensions of burial mounds are frequently given in site reports. It is something that is almost always done, but that almost never figures into the subsequent analysis. The position taken here is that the total volume of earth used in the construction of a given mound group is the most practical measure of site size. Of course, this volume has in a number of cases changed significantly due to plowing and other modern disturbances, but this type of alteration is assumed to be uniform across all regions in this study. The volume per mound was calculated by the following formula: $v = \pi \left(\frac{r^2h}{2} + \frac{h^3}{6}\right)$ where r equals the radius and h equals the height. Since information on mound size was not available in all cases, it was sometimes necessary to estimate it. Two approaches were used. If either the height or the diameter was given, the unknown dimension was estimated by using a mean score calculated from data on the five mounds in the region that were closest to the mound in question on the known dimension. If neither dimension was available, mound volume was estimated by using the median volume calculated for mounds of known dimensions in the region. Because of the presence of extreme values, the median was judged in this case to be the best measure of central tendency.

SCIOTO TRADITION—HOPEWELL PHASE

The Scioto tradition was first defined by Prufer (1965) to emphasize the continuity of the successive Woodland cultures of the central Ohio Valley. Prufer's Hopewell phase represents that cultural manifestation coincident and participating in the Interaction Sphere. It is marked by the appearance of Hopewell series ceramics in local assemblages and should extend roughly from A.D. 1 to A.D. 350. Prufer's utilitarian Scioto series pottery is probably the best diagnostic characteristic of the Hopewell phase, and the distribution of the associated types McGraw Plain and McGraw Cordmarked are taken as best indicating the distribution of this cultural tradition during the period in question. McGraw pottery is typically grit-tempered and is found throughout much of what is now Ohio. It extends to the east into the Muskingum Valley beyond which it grades into the Mahoning Cordmarked pottery of the upper Ohio drainage (O. Prufer, personal communication). Typical McGraw vessels have recently been identified from the West Farmington mound in the upper Mahoning Valley (N. Greber, personal communication), and this would appear to be about the northeastern limit of this tradition. Prufer feels that McGraw pottery is primarily limited to stream valleys draining southward into the Ohio River, although it is found sporadically in the northern portions of the state as well (O. Prufer, personal communication). For example, McGraw as well as rocker-stamped pottery is present at the Hinkelman Site in northcentral Ohio near Lake Erie. McGraw series associated with Turner Simple Stamped material has also been found in the Cuyahoga Valley (Brose 1974). The problem in this northern area is that there are several grit-tempered wares present, and it is often difficult to segregate them.

Grit-tempered McGraw pottery is found in the upper valleys of the Great and Little Miami rivers, but sites near their confluences with the Ohio evidence a predominance of limestone tempering (Prufer 1968; Lee and Vickery 1972). Limestone-tempered McGraw ceramics continue to the south and west of this area, although the tradition itself becomes very much attenuated. Reidhead (1976, pp. 13, 26-28) has recently tested two buried Middle Woodland habitation sites with McGraw ceramics and corner-notched points near Louisville, and this would appear to define a southwestern terminus for this tradition. Certainly downriver from this point evidence for Scioto tradition manifestations is negligible. One suspects that perhaps this southern McGraw pottery is also part of a continuum, grading into Mulberry Creek Plain and other southeastern types south of the Bluegrass region. Both the Anderson works on the upper White River and Newcastle on the Blue River in Indiana have major Hopewell occupations. At both sites the majority of the pottery is a plain, limestone- or grit-tempered ware that appears to fit within the range of variation of McGraw (see Vickery 1970; White 1968; Buchman 1968), but these sites would mark the approximate western limit of this tradition. The data presented above, together with Griffin's (1967) distributional information, serve to roughly delineate the spatial extent of the Scioto tradition during the Hopewellian phase (see Figures 1 and 2).

There is some debate as to the subsistence-settlement orientation of the Scioto tradition. Prufer (1961a; 1965) has argued that the evidence suggests a dispersed pattern of swidden farmsteads organized around vacant ceremonial centers analogous to those of lowland Mesoamerica. Fischer (1974, pp. 129-44) argues that these centers were not in fact vacant, but intensively occupied. This is based primarily on his interpretation of the post-mold patterns found under many of the burial mounds as the remnants of houses. He recognizes the association of a number of small habitation sites such as McGraw with the large "nucleated" centers (see Prufer 1965; 1967, p. 275), but also identifies a "dispersed" pattern of habitation sites in less ecologically advantageous situations. The evidence supports Fischer's claim of nucleated and dispersed communities, but the fact remains that the amount of habitation debris encountered within the major earthworks is minimal. Both Prufer (1961a, p. 732) and Griffin (1960) have argued that agriculture was an important

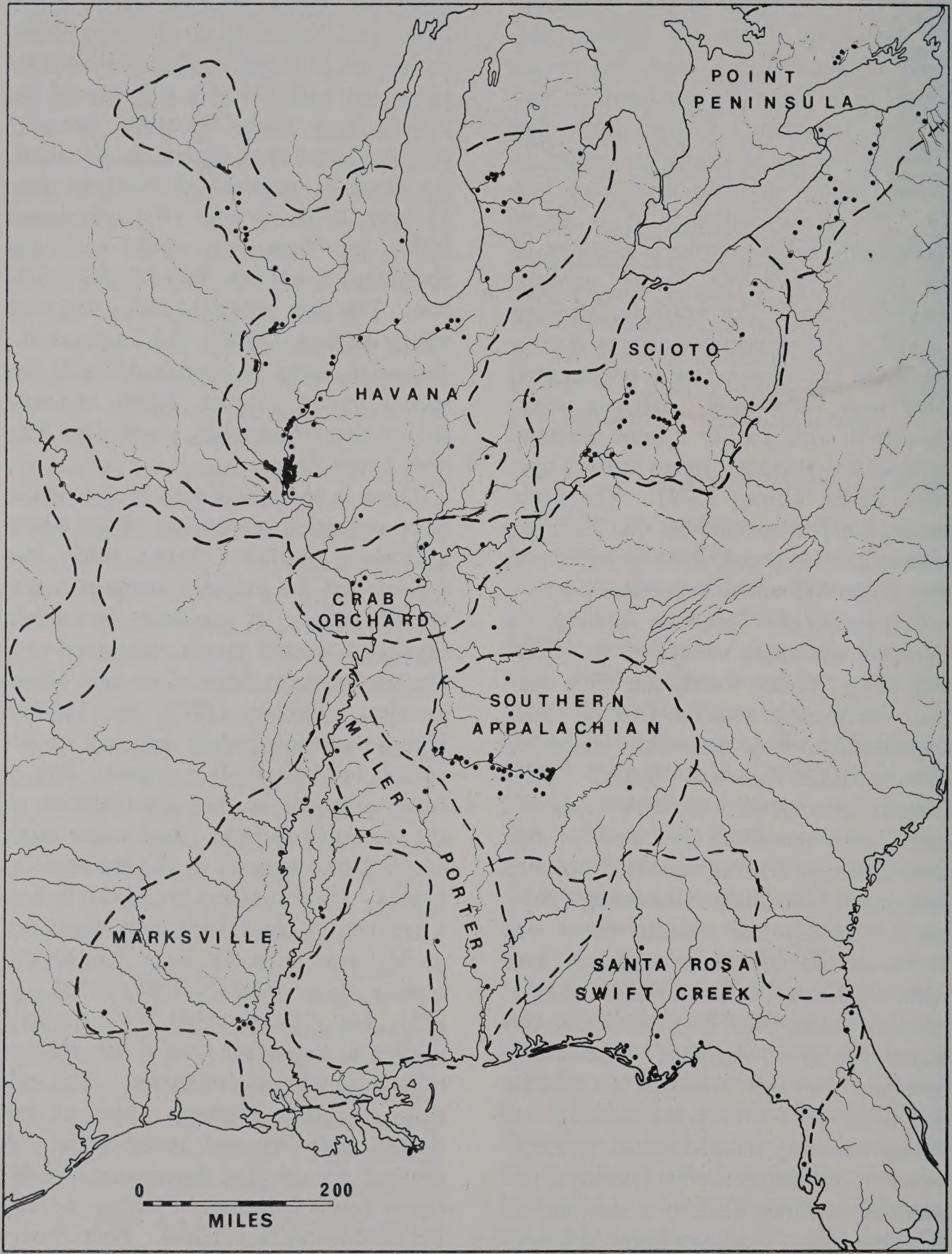

Figure 1. Distribution of major regional traditions during the Middle Woodland period

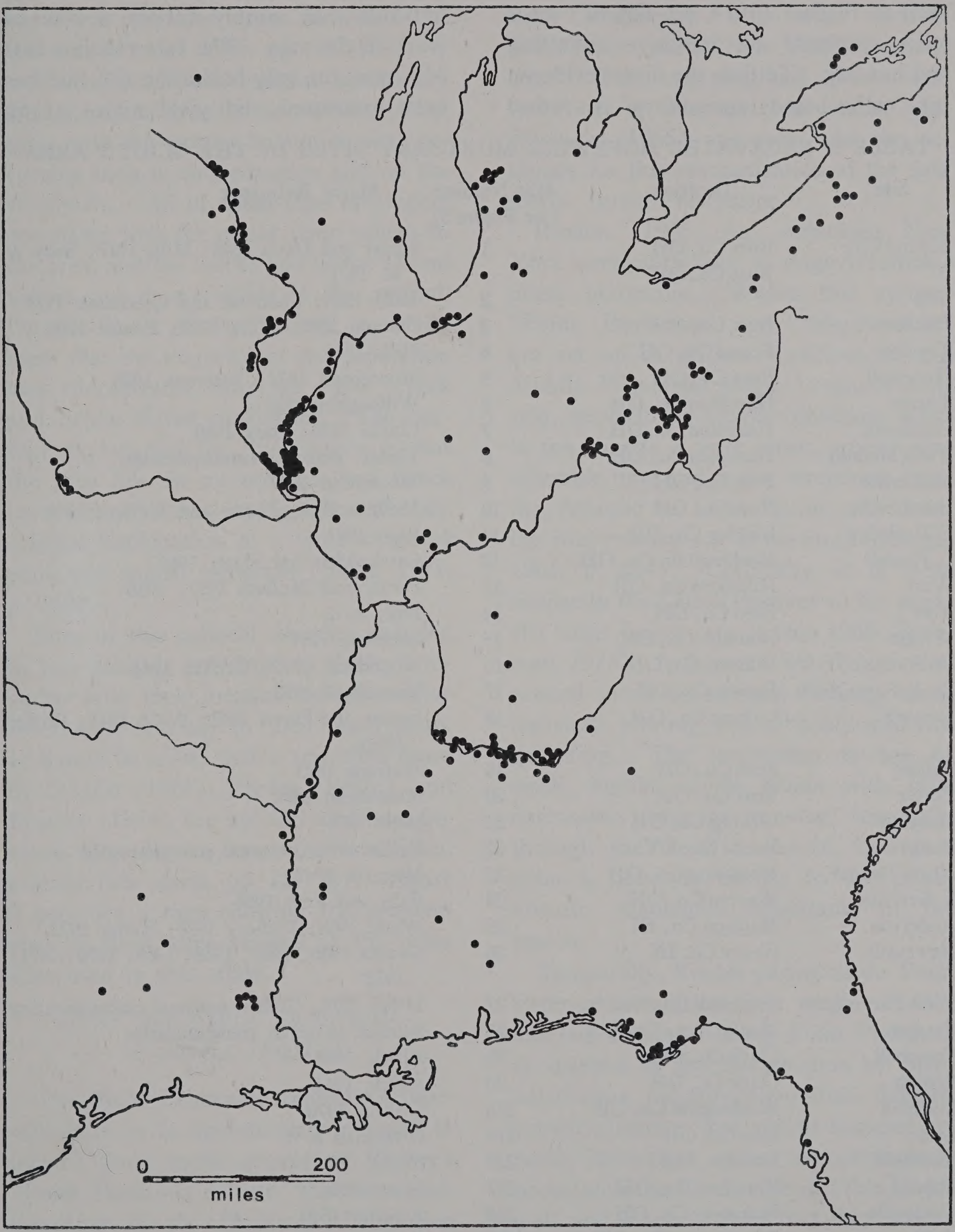

Figure 2. Distribution of Hopewell mortuary sites in the analysis

part of the subsistence base, while others such as Fischer (1974, pp. 264-67) place more emphasis on intensive collecting and hunting. To date the direct evidence for maize-based agriculture is rather limited (Struever and Vickery 1973), but this may simply reflect a lack of work in the area. The fact remains that McGraw, the only habitation site that has been excavated, did yield maize of an

TABLE 2. EXCAVATED HOPEWELL MORTUARY SITES IN THE SCIOTO AREA

Site	Location	Map Number (see Figure 3)	Major Reference
Mound City	Ross Co., OH Ross Co., OH	1	Squier and Davis 1848; Mills 1922; Baby *et al.* 1971
Seip		2	Mills 1909; Shetrone and Greenman 1931
Harness	Ross Co., OH	3	Putnam 1886; Mills 1907; Prufer 1968
Tremper	Scioto Co., OH	4	Mills 1916
Hopewell	Ross Co., OH	5	Moorehead 1922; Shetrone 1926
Turner	Hamilton Co., OH	6	Willoughby 1922
Cincinnati	Hamilton Co., OH	7	Clarke 1876; Starr 1960
Twin Mounds	Hamilton Co., OH	8	Theler, personal communication
McKenzie	Pike Co., OH	9	Moorehead 1899
Bourneville	Ross Co., OH	10	McBeth 1960; Porter and McBeth 1960
E. Rutledge	Licking Co., OH	11	Baby 1961
L. Russell	Muskinghum Co., OH	12	Carskadden and Slater 1969
West	Hillsboro Co., OH	13	Porter and McBeth 1957; 1958
Ater	Ross Co., OH	14	Baby n. d.
Wright	Franklin Co., OH	15	Shetrone 1924
Ft. Ancient	Warren Co., OH	16	Moorehead 1890; Griffin 1943
Boyle Farm No. 6	Brown Co., OH	17	Moorehead 1892
Newark	Licking Co., OH	18	Squier and Davis 1848; Webb 1941; Prufer 1961a
Shilder	Ross Co., OH	19	Shetrone 1925
Porter	Ross Co., OH	20	Moorehead 1892
Hazelett	Licking Co., OH	21	Mills 1921
Rodgers	Boone Co., KY	22	Kellar 1960; personal communication
North Benton	Mahoning Co., OH	23	Magarth 1945
F. Griffith	Warren Co., OH	24	Baby and Frye 1964
Anderson	Madison Co., IN	25	White 1968; Vickery 1970; Kellar 1973
Newcastle	Henry Co., IN	26	Swartz 1966; 1967; 1968; 1969; 1970; 1971; 1972
West Farmington	Trumbull Co., OH	27	Miller 1878; Greber, personal communication
Perdum	Montgomery Co., OH	28	Allman, personal communication
Campbell	Clark Co., OH	29	Altick, 1941
Boblett	Clark Co., OH	30	Altick, 1941
Marietta	Washington Co., OH	216	Griffin 1970
Esch	Erie Co., OH	217	Greenman n. d.
Rockhold	Ross Co., OH	223	Prufer 1961
Shinkal	Hamilton Co., OH	237	Starr 1960
Circleville	Pickaway Co., OH	238	Atwater 1820
Kohl	Tuscarawas Co., OH	239	Shane, personal communication
Caldwell	Ross Co., OH	240	Kramer 1951; Prufer 1961
I. Coy	Greene Co., OH	241	Wood and Allman 1961

"advanced" variety similar to the Northern Flint recovered from Mound 34 at Cahokia (Prufer 1965, pp. 107-109).

The major Scioto tradition centers are located on the broad river terraces in the area, with the smaller habitation sites occurring both in this situation and on the floodplain. All of these sites are highly correlated with the major river valleys in the area, and the Scioto and Great Miami valleys are most notable in this regard. On the basis of site density, it would seem that the majority of the population was concentrated near the Paint Creek and Scioto River confluence. The current explanation for this pattern is that the area lies on an ecotone, and hence provides certain advantages for the aboriginal exploitation of a wide range of plant and animal resources (Shane 1971, p. 146).

Sites of this cultural complex included in this analysis are listed in Table 2 together with their location and the major references relating to their excavation. It should be noted that a few sites listed by Griffin (1967), Prufer (1961a), and Fischer (1974) are not included here because they do not meet the established criteria (see above, pp. 257-58). Figure 3 provides a map showing the provenience of these sites as well as the other sites used in this study.

POINT PENINSULA TRADITION—HOPEWELL HORIZON

The Point Peninsula tradition—Hopewell horizon is operationally defined to include those social groups of Ritchie's "Point Peninsula culture" that were participating in the Hopewell Interaction Sphere, as well as sites further to the southwest that are of somewhat more ambiguous cultural affiliation. It is spatially isomorphic with what Griffin (1967) has called "New York Hopewellian." This organizational framework, however, is somewhat at odds with Ritchie's (1965) approach, and the rationale for this reorganization of the data merits further discussion.

Ritchie (1965) has organized New York prehistory into a stage/tradition/phase taxonomy. Within this system, "Point Peninsula" and "Hopewellian" are set up as distinct traditions of the Middle Woodland stage. Point Peninsula, emphasizing a basic continuity within the Vinette 2 ware series, covers considerable time and space, stretching from the Atlantic to Lake Huron and from the first century A.D. to the ninth (Ritchie 1965, p. 204). Culturally, it is quite similar to the Laurel complex of the western Great Lakes (see Janzen 1968; Stoltman 1973); both were heavily oriented toward intensive seasonal fishing, canoe traveling, hunting, and probably wild rice gathering. The impression is one of small, highly mobile bands with little extraneous baggage moving seasonally through the Great Lakes-St. Lawrence area—a life-style similar to the protohistoric Algonquin inhabitants of the region.

Temporally, Ritchie partitions the Point Peninsula tradition into early, middle, and late divisions. Early Point Peninsula as marked by the introduction of channeled rims, pseudo-scallop shell, dentate, complex-dentate, and rocker-stamped ceramic decorative styles, is contemporaneous with the florescence of Ohio Hopewell, and it seems likely that these modes were derived from the south (Janzen 1968, p. 108). As in many other regions

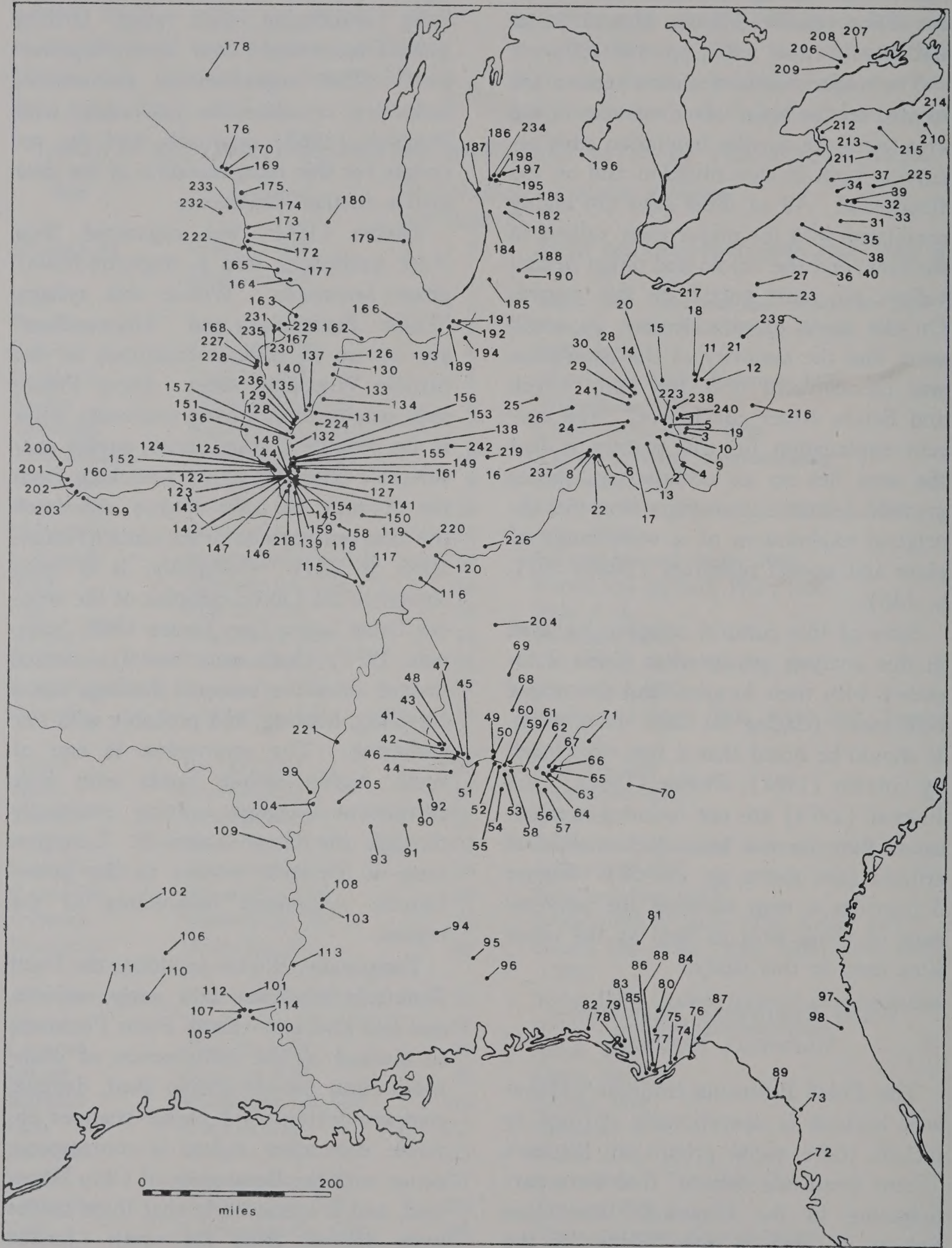

Figure 3. Distribution of Hopewell sites used in this study

of eastern United States, with the end of "Hopewell influence" these techniques were abandoned and replaced by simple cord-marked surface treatment in the subsequent Middle Point Peninsula (Ritchie 1965, p. 232).

Spatially, Early Point Peninsula on the basis of its diagnostic ceramics extends westward into southcentral Ontario. In this area it is difficult to identify a clear-cut cultural boundary since sites in the area reflect ceramically both Laurel and Point Peninsula characteristics. As a point of convenience, however, this division can be drawn between the Frank Bay site on the north shore of Lake Huron, which has a predominance of Point Peninsula material, and the Shequiandah site about thirty miles to the west with its amalgamation of Laurel, Havana, and Point Peninsula ceramics (see Wright 1967). This division places Wright's Saugeen focus (Wright and Anderson 1963) in Point Peninsula, a position supported by both Griffin (1967) and Stoltman (1973, p. 113). The "cultural heartland" of Early Point Peninsula apparently extends to the Richelieu River and Lake Champlain to the east and to the lower reaches of the Ottawa River drainage to the north (Ritchie 1965, p. 207). On the basis of recent evidence, Early Point Peninsula extends to the southeast into the upper Susquehanna drainage at least as far south as the present New York–Pennsylvania border (Ritchie and Funk 1973). Importantly, Early Point Peninsula habitation sites are not known from the unglaciated Allegheny Plateau of southwestern New York and northwestern Pennsylvania (W. Ritchie, personal communication), an area where a number of the mortuary sites of Ritchie's "Hopewellian tradition" and Griffin's "New York Hopewellian" are located.

Ritchie's Hopewell tradition has but a single phase, Squackie Hill, and it transects the Point Peninsula tradition sometime after A.D. 1, thus suggesting an intrusion into the area (Ritchie 1965, p. 214). Although earlier Ritchie (1938, pp. 39-40) stated that this did in fact represent a migration or "budding off" from the Ohio centers, he appears to take a less definite position in 1965. In point of fact, however, the formal organization of the archaeological material emphasizes a division between Point Peninsula and Hopewell and thus still suggests cultural intrusion. Importantly, in contrast to Point Peninsula, all of the sites included by Ritchie in the Hopewellian tradition are mortuary sites. He notes that habitation sites of the Hopewellian Squackie Hill phase have never been discovered (Ritchie 1965, p. 214). Ten years later, researchers in the area have yet to identify a Squackie Hill phase habitation site, although mortuary sites continue to be discovered (N. Trubowitz, personal communication).

It is tempting to argue at this point that the Squackie Hill phase mounds *are* in fact products of Early Point Peninsula culture and that the "Hopewellian tradition" taxon should be abandoned. This would at least put these mounds back into some sort of local cultural matrix. It would also be congruent with Ritchie's own interpretation of the succeeding Kipp Island phase of Middle Point Peninsula. Here he notes that the mortuary complex is derived ultimately from the Intrusive Mound Culture of the Ohio Valley, but is culturally associated and produced by the indigenous Point

Peninsula peoples (Ritchie 1965, p. 228).

Additional support for the position that the Hopewell mounds of New York were produced by local Point Peninsula peoples can be found in Johnston's (1968a) and Griffin's (1967) assertion that the burial mounds found in the Rice Lake area of southern Ontario, which are similar in many respects to the mounds of New York, were constructed by Early Point Peninsula peoples. The presence of flake knives in both the Point Peninsula habitation sites and the Hopewellian mounds might also suggest a cultural link (Ritchie 1965, pp. 211, 214). Ceramics have been found infrequently in burial association, but the Lewiston Mound, a site located near Niagara Falls and dated to A.D. 160±80 (Y–1276), did produce a considerable number of diagnostic Early Point Peninsula sherds in the fill. None of the other mounds in northern or central New York produced any ceramics that could be used to argue against a Point Peninsula affiliation.

On the negative side, it is difficult to envision the mounds in the Allegheny Plateau country southwest of the Great Lakes drainage as directly related to Point Peninsula. The area is outside the known range of the Point Peninsula tradition, although the size, location, and contents of the mortuary sites are quite similar to those recorded to the north. The local Middle Woodland pottery is Mahoning Cordmarked, a type most closely related to the McGraw material found in the Scioto area. Mahoning Cordmarked does not seem to have been dated directly by radiocarbon techniques, but it was found stratigraphically underlying early Late Woodland Watson ware in the area (Mayer-Oakes 1955, p. 183).

Thus, it would seem that in terms of basic adaptations as well as ceramics there is a gradually changing pattern of Hopewell material stretching linearly from the Scioto area in the southwest to the Rice Lake area of Ontario. The definition of the complexes involved remains poorly worked out, but it is argued here that most of the known sites relate most strongly to a lake-forest adaptation. Therefore, for purposes of this study a Point Peninsula region is defined to incorporate those mortuary sites which Griffin called "New York Hopewellian" and that Ritchie has labeled the "Hopewell tradition." These sites are listed in Table 3. The approximate spatial limits of the complex are shown in Figure 1, and the specific location of each site is given in Figure 3.

SOUTHERN APPALACHIAN TRADITION—HOPEWELL HORIZON

There is a long tradition of paddle-stamped pottery in the southern Appalachian region (McMichael 1960). This apparently is initiated with the diffusion of simple and check stamping out of the southeast Georgia lowlands during Deptford times. Stamp styles undergo considerable alteration through time, but the basic technique continues in the Middle South into the historic period. Check stamping was the pre-eminent mode in the area at the time of Hopewell interaction. Limestone-tempered Wright Check Stamped predominates in the Tennessee drainage while sand-tempered Cartersville Check Stamped is found across Lookout Mountain in the upper Chattahoochee and Coosa drainages of north Georgia. A number of other types

TABLE 3. EXCAVATED HOPEWELL MORTUARY SITES IN THE POINT PENINSULA AREA

Site	Location	Map Number (see Figure 3)	Major References
Sugar Run	Warren Co., PA	31	Bliss 1942; Mayer-Oakes 1955
Vandalia	Cattaraugus Co., NY	32	Carpenter 1950b
Poland	Cattaraugus Co., NY	33	Carpenter 1950b; Thomas 1894
Cain	Erie Co., NY	34	Ritchie 1944; 1965
Irvine	Warren Co., PA	35	Thomas 1894; Carpenter 1956
Nelson	Crawford Co., PA	36	Carpenter and Schoff 1951
Cattaraugus	Cattaraugus Co., NY	37	Griffin 1967; Hart 1975
Clovna	Erie Co., PA	38	Carpenter 1950b
Killbuck	Cattaraugus Co., NY	39	Carpenter 1950b
Danner	Crawford Co., PA	40	Clark *et al.* 1960
Serpent	Petersborough Co., ON	206	Johnston 1968a; 1968b
Levesconte	Northumberland Co., ON	207	Johnston 1968a; Ritchie 1965
Cameron's Point	Northumberland Co., ON	208	Johnston 1968a
Sugar Island	Petersborough Co., ON	209	Johnston 1968a
Rector	Wayne Co., NY	210	Ritchie 1965
Geneseo	Livingston Co., NY	211	Ritchie 1938; 1944
Lewiston	Niagara Co., NY	212	Ritchie 1965
Squackie Hill	Livingston Co., NY	213	Ritchie 1938; 1965
Bluff Point	Cayuga Co., NY	214	Carpenter 1950a; Ritchie 1965
Wheatland	Monroe Co., NY	215	Carpenter 1950a
Caneada	Allegheny Co., NY	225	Trubowitz, personal communication

are consistently associated with these check-stamped forms: Mulberry Creek Plain, Flint River Cordmarked, Candy Creek Cordmarked, Pickwick Complicated Stamped, Bluff Creek Simple Stamped, and Long Branch Fabric Marked in the Tennessee drainage with Wright Check Stamped, and the analogous sand-tempered Cartersville Simple Stamped, Early Swift Creek Complicated Stamped, and untyped plain and cordmarked pottery with Cartersville in north Georgia (Caldwell 1950, p. 17; Chapman 1973, p. 42; Wauchope 1966; Webb 1939; Webb and DeJarnette 1942; Bacon and Merryman 1973; Griffin 1974; Walthall 1973). In both cases these types appear to be concentrated north of the Fall Line and south of the Blue Ridge Mountains of western North Carolina.

The available radiocarbon evidence suggests that habitation sites producing these pottery types were most intensively occupied from about A.D. 150-400 (Bacon and Merryman 1973; Faulkner and McCollough 1974; Griffin 1974; Kneberg 1961; Walthall 1973). This would correspond to current estimates for the climax of the "Copena culture" (Webb 1939), an hypothesis further substantiated by Walthall's (1972) recent dates from two Copena mounds and by the association of Southern Appalachian tradition ceramics with late Marksville types at Pharr (Bohannon 1972).

Walthall and Keel (1974) have divided the Southern Appalachian province into five Middle Woodland phases that correspond to different river basins in the area. "Copena phase" pertains to the

Middle Tennessee Valley, "McFarland" to the Elk and Duck river valleys, "Candy Creek" to the upper Tennessee, "Cartersville" to the upper Chattahoochee and Coosa, and "Connestee" to the Appalachian summit area. In all of these areas, major habitation sites are correlated with riverine settings, but there are also a number of smaller camps in the uplands.

On the basis of mortuary site distribution (see Figures 1 and 2), the area within the Copena phase was definitely the most intensively occupied territory within this tradition. Sites do not appear to be concentrated or clustered in any particular locality along this portion of the Tennessee, but rather are quite homogeneously distributed from the Pickwick Basin in western Alabama to the Guntersville Basin to the east. Walthall (1973) notes that this distribution is highly correlated with the presence of a broad floodplain and argues on indirect evidence that the Copena phase was both dependent on agricultural subsistence and only slightly less complex culturally than Ohio Hopewell. Both Faulkner (1971) and Walthall (1973) suggest that the location of the area, midway between Ohio and the Gulf Coast and astride major historic trails, may have contributed to cultural development.

It does not appear that the peoples living in the Duck and Elk river drainages participated as extensively in interregional exchange and interaction. Walthall and Keel (1974, p. 4; see also Faulkner and McCollough 1974) suggest that this is a result of a smaller, more marginally located population base. Although this region was apparently less intensively occupied, Faulkner (1973, p. 37) suggests that the major McFarland occupations were near the Old Stone Fort on the upper Duck and hypothesizes that this reflects this area's favorable environmental setting on the border of two ecological zones. Although the area to the north of the Nashville Basin is not well known at present, it appears that McFarland or McFarland-like manifestations are also present in the central Cumberland Valley (Butler 1971; Dowd 1969; B. Butler, personal communication; S. Fox, personal communication). However, stamping appears to be even less common, while plain and cord-marked surface treatments are in greater frequency.

As with McFarland, the evidence from the Cartersville, Candy Creek, and Connestee subregions does not suggest a particularly intense involvement with the Hopewell mortuary complex. Only two mound groups are known from the Cartersville area and none have been reported from Candy Creek or Connestee. The habitation sites appear to have been larger and more frequent in the Cartersville area than in the upper Tennessee drainage (Caldwell 1950; Kelley 1973; Wauchope 1966; Chapman 1973; Kneberg 1961; Keel 1972).

Known mound groups within the Southern Appalachian region are listed in Table 4 and the specific location of each site is given in Figure 3.

Gulf Coast Tradition—Hopewell Horizon

Caldwell (1958) perceived a basic continuity in the historical development of Gulf Coast cultures and emphasized the importance of communication and interaction across the Gulf Coast lowlands in maintaining this regional homogeneity.

TABLE 4. EXCAVATED HOPEWELL MORTUARY SITES IN THE SOUTHERN APPALACHIAN AREA

Site	Location	Map Number (see Figure 3)	Major References
Boyd's Landing	Hardin Co., TN	41	Webb and DeJarnette 1942
Fisher	Hardin Co., TN	42	Webb and DeJarnette 1942
Yellow Creek	Hardin Co., TN	43	Moore 1915
Mingo	Tishomingo Co., MS	44	Jolly 1971
Wright	Lauderdale Co., AL	45	Webb and DeJarnette 1942
Riverton	Colbert Co., AL	46	Moore 1915
Colbert Creek	Lauderdale Co., AL	47	Webb and DeJarnette 1942
Perkins Springs	Lauderdale Co., AL	48	Moore 1915
Lauderdale	Lauderdale Co., AL	49	Webb 1939
Tick Island	Lauderdale Co., AL	50	Webb 1939
Hog Island	Colbert Co., AL	51	Fowke 1928
Basden	Lauderdale Co., AL	52	Walthall 1973
Big Shoal Creek	Lauderdale Co., AL	53	Walthall 1973
Alexander	Lawrence Co., AL	54	Fowke 1928
Terry and Simms	Lauderdale Co., AL	55	Walthall 1973
Penn	Morgan Co., AL	56	Walthall 1973
Turney	Morgan Co., AL	57	Walthall 1973
Robinson	Morgan Co., AL	58	Walthall 1973
Limestone Creek	Morgan Co., AL	59	Moore 1915
Leeman	Morgan Co., AL	60	Walthall 1973
Slaughter Place	Morgan Co., AL	61	Moore 1915
Walling	Madison Co., AL	62	Walthall 1973
Samuels	Marshall Co., AL	63	Webb and Wilder 1951
Ross	Marshall Co., AL	64	Webb and Wilder 1951
Roden	Marshall Co., AL	65	Webb and Wilder 1951; Walthall 1973
Columbus City	Marshall Co., AL	66	Webb and Wilder 1951
McDonald	Marshall Co., AL	67	Walthall 1973
Marshall Co. Md.	Marshall Co., AL	68	Thruston 1897
Franklin	Williamson Co., TN	69	Jennings 1946; Putnam 1882; Faulkner 1968
Shaw	Bartow Co., GA	70	Waring 1945
Tunacunnhee	Dade Co., GA	71	Jefferies 1975

In recognition of this long-term regional unity, he suggested the concept of a Gulf Coast tradition. Caldwell's original concept has been modified somewhat over the years (e.g. Sears 1964; Bullen 1974), but the basic approach still appears to be a useful one. Within this tradition there is a Hopewell horizon that begins sometime during the first or second century A.D. It is marked by the introduction of new vessel forms, decorative modes, an increase in the number of habitation sites, the widespread construction of burial mounds, and the presence of Interaction Sphere goods in local assemblages. For a variety of historical reasons, this horizon has been previously divided into at least three major cultural complexes—Miller Hopewell, Porter Hopewell, and Santa Rosa-Swift Creek.

Santa Rosa-Swift Creek Hopewell

"Santa Rosa-Swift Creek" was defined by Willey (1949) on the basis of his work on the west coast of Florida. It is apparently a local development in north Florida out of a Deptford base (Sears 1964). The inception of this complex is marked by the first production of complicated stamped pottery in the eastern United States, a concept that was eventually to spread to a variety of areas and that continued to historic times. The earliest radiocarbon date for this type of pottery, 60±150 B.C., is from the Halloca Site located in south Georgia (McMichael 1964, p. 126). Of the four complicated-stamped types of the Swift Creek series defined by Willey for the period, Swift Creek Complicated Stamped (early variety) is by far the most prevalent. Sand tempering is predominant in all types, but Phelps (1969, p. 18) has recently noted that grog tempering is not uncommon in west Florida.

In addition to the Swift Creek series, there are two other major ceramic series associated with this cultural complex. Both of these are also predominantly sand-tempered. The Santa Rosa series, with its constituent types, Alligator Bayou Stamped, Basin Bayou Incised, Santa Rosa Stamped, and Santa Rosa Punctate, definitely represents local copies of late Marksville types (see Ford 1952, p. 361, Figure 16; Phillips 1970, p. 120). As might be expected, Santa Rosa pottery appears to have attained greater popularity near the mouth of Mobile Bay and the sand islands off the coast of west Florida than farther to the east where "Marksville influence" appears to be somewhat less significant. In contrast, Willey's Crystal River series is most concentrated in the east, with the majority of the material occurring on Apalachee Bay between the mouth of the Apalachicola and the Crystal River Site (Trickey 1957, p. 593; Phelps 1969, p. 17).

The origin of the Crystal River series is still somewhat open to question. There does not appear to be a good local progenitor for this material. Further, the Crystal River Site, with its stone stellae, solar observatory, and temple mound is definitely unusual for the area (see Bullen 1966; Hardman 1971). On the basis of these facts, several archaeologists have suggested that the Crystal River complex resulted from contact and colonization from Mesoamerica (McMichael 1964; Ford 1969). They are quite possibly correct; certainly a better case can be made here for direct Mesoamerican contact than for any other archaeological complex in the eastern United States on this time horizon. In contrast to the position of these authors, however, this has very little significance for explaining the introduction and maintenance of Hopewell interaction and exchange; the Crystal River Site and its associated ceramic industry are far too late temporally to have contributed essential components to Hopewell. Particular lines of evidence leading to this conclusion are: 1) both Alligator Bayou Stamped and Crystal River Incised share a number of decorative motifs with late Marksville material (compare, for example, Willey 1949, Figure 31a with Bullen 1970, p. 107c and Phillips 1970, Figure 441); 2) Crystal River modes such as T-shaped rims and negative painting appear in late Hopewell contexts in other regions; 3) the available radiocarbon dates associated with Crystal River material suggest a temporal placement no earlier than A.D. 200; 4) interregional artifact types found at Crystal River, such as panpipes and figurines, are found in middle to late contexts in other regions; 5) there is a strong continuity between Crystal River and the subsequent Weeden Island period in both decorative techniques and vessel shapes. In fact, it would seem more likely that Crystal River may be ultimately more important in explaining the origin of Weeden Island and perhaps other "early Mississippian" complexes than it is for Hopewell.

The distribution of Santa Rosa–Swift Creek sites strongly suggests a coastal orientation. Willey (1949, p. 368) notes that sites associated with this complex are found from Escambia to Manatee County, Florida, but subsequent work has expanded this distribution down the west coast, across the peninsula to the east coast, and up the Apalachicola and Chattahoochee rivers (Bullen 1950; McMichael and Kellar 1960; Kellar *et al.* 1962; Phelps 1969; Wilson 1965). The most conspicuous habitation sites are large coastal shell middens, but Phelps (1969, pp. 15, 19) notes that there are also seasonally occupied inland sites within the territory. Willey (1949, p. 394) notes that the shell middens are roughly three times as prevalent as mortuary sites and suggests that more than one settlement participated in the construction of particular mounds. Marine resources, particularly fish and shellfish, formed a considerable portion of the subsistence base. Deer appears to be one of the few inland resources known to have been intensively sought (Sharon and Bunn 1973). At present there is no direct evidence that maize agriculture was of any importance in Santa Rosa–Swift Creek subsistence, although Sears (1971) has recently interpreted the presence of maize pollen in a ritual context as evidence for the ceremonial importance of maize in southern Hopewell.

It is quite clear that the focus of Santa Rosa–Swift Creek culture was at the mouth of the Apalachicola River. Mounds and mound groups are most concentrated in this area. With regard to this fact, Willey (1949, p. 279) notes that this delta region was undoubtably one of the most favorable environments in the Southeast. It should be noted, however, that in contrast to this general clustering near the Apalachicola, the Crystal River Site, possibly the most important and complex site in the area, is located in relative isolation far down the coast to the southeast.

Twenty mound groups are included in this analysis as Santa Rosa–Swift Creek mortuary sites (Table 5). This number represents considerably more sites than Griffin (1967) includes and is more in line with the interpretations of Willey (1949) and Sears (1953, pp. 21-23; 1962). Some of this discrepancy no doubt results from the fact that many of the Florida burial mounds are multicomponent. Largely as a result of Moore's excavation techniques, it is often difficult to assess the relative strength of these components. This study includes all sites where there is good evidence for a strong Santa Rosa–Swift Creek component.

St. Johns and Lake Okeechobee

There are two Hopewell manifestations in Florida that are difficult to relate to broader cultural traditions. Both the St. Johns River area of the Florida east coast and the area around Lake Okeechobee in southcentral Florida have produced

TABLE 5. EXCAVATED HOPEWELL MORTUARY SITES IN THE SANTA ROSA-SWIFT CREEK AREA

Site	Location	Map Number (see Figure 3)	Major References
Safford	Pinellas Co., FL	72	Walker 1880; Cushing 1897; Bullen *et al.* 1970
Crystal River	Citrus Co., FL	73	Moore 1903; 1907; 1918; Bullen 1953
Green Point	Franklin Co., FL	74	Moore 1902
Porters Bar	Franklin Co., FL	75	Moore 1902
Yent	Franklin Co., FL	76	Moore 1902
Pierce	Franklin Co., FL	77	Moore 1902
Anderson's Bayou	Bay Co., FL	78	Moore 1901
Alligator Bayou	Bay Co., FL	79	Moore 1902
Asaphalaga	Gadsden Co., FL	80	Moore 1907
Mandeville	Clay Co., GA	81	Kellar *et al.* 1962
Basin Bayou	Walton Co., FL	82	Moore 1918
Bakers Landing	Bay Co., FL	83	Moore 1902
Md. below Bristol	Liberty Co., FL	84	Moore 1903
Eleven Mile Pt.	Franklin Co., FL	85	Moore 1901
Huckleberry Ldg.	Franklin Co., FL	86	Moore 1902
Spring Creek	Wakulla Co., FL	87	Moore 1902
Jackson	Franklin Co., FL	88	Moore 1902
Cedar Key	Levi Co., FL	89	Willey 1949
Mayport	Duval Co., FL	97	Wilson 1965
Murphy Is.	Putnam Co., FL	98	Moore 1896

Hopewell material, but the relationships with other archaeological complexes are in both cases not well understood. As with Santa Rosa–Swift Creek, both the St. Johns and Lake Okeechobee material apparently were locally preceded by, and evolved out of, a Deptford base. Also, both exhibit relatively high percentages of plain sand-tempered ceramics, another characteristic shared with Santa Rosa–Swift Creek. It is difficult, however, especially with the Lake Okeechobee material, to place these cultural complexes in the Gulf tradition. Bullen (1970) sees them both as distinct cultural regions with locally evolving ceramic traditions of their own. Perhaps this will eventually be shown to be the case, but at present the evidence is fragmentary and somewhat ambiguous.

With respect to St. Johns, it appears that both an untempered, chalky-paste plain ware (St. Johns Plain) and a sand-tempered (unnamed) ware were manufactured in the same region. Both sand-tempered Deptford and Swift Creek series were also present, and the Swift Creek material at least appears to be a local product (Wilson 1965). Mayport Dentate Stamped, a rocker dentate type similar to Santa Rosa Stamped, is another local type. Both Goggin (1952, p. 76) and Bullen (1970) emphasize the continuity of the untempered St. Johns ceramics with earlier material and suggest a strong local tradition with "influences" from the Gulf Coast during the Hopewell horizon. Wilson (1965), on the other hand, suggests that there is early Santa Rosa–Swift Creek *senso stricto* here and that the confusing ceramic situation results from the proximity of late Deptford to the north. The latter interpretation is followed in the present study, and the two known Florida east coast mortuary sites, Mayport and Murphy Island, are listed in Table 5.

Regardless of what is ultimately decided about external relationships, it appears that local cultural activity on this time horizon was concentrated near the mouth of the St. Johns River; it is here that both of the burial mounds and most of the habitation sites are located (Goggin 1952, p. 69). The one radiocarbon date from the area A.D. 85±95 (GX0315) from the Mayport mound is consistent with the artifactual evidence suggesting contemporaneity with early Santa Rosa–Swift Creek.

Sears (1971) has recently excavated a complex ceremonial center near Lake Okeechobee. Four of these centers are currently known from the area. On the basis of the evidence from Ford Center, the ceramics of this cultural complex—as yet unnamed—are relatively simplistic and suggest a de-emphasis on decoration of pottery vessels when compared to the Gulf Coast material. The site is relatively complex, with living areas, a plaza, excavated ditches, a platform mound, an artificial ceremonial pond, and a charnel platform associated with carved wooden stellae. Sears attributes considerable importance to the ritual association of maize pollen at the site and posits a strong emphasis on a maize agriculture as part of the local subsistence base. He goes on to point out the apparent association of the "Hopewell religion" with the spread of agriculture in the eastern United States. On the basis of present evidence, his case may be somewhat overstated.

Tombigbee Hopewell: The Porter and Miller complexes

Wimberly (1960) is responsible for the definitive study on "Porter Hopewell," although the complex had been recognized for some time (e.g. Phillips *et al.* 1951, pp. 438-39). Its location on the lower Tombigbee and Mobile Bay places Porter in an intermediate position between the more populated Marksville area of the delta region and Santa Rosa–Swift Creek to the east, and this is reflected in the local ceramics. Phillips *et al.* (1951, p. 437) note that "the complex in this period corresponding to early Baytown takes on even more the cast of the Gulf Coast." Sears (1964, p. 267) calls it ". . . a thorough mixture of Early Troyville and Early Swift Creek." The currently available evidence indicates somewhat stronger ties to the Gulf Coast on this time horizon. For example, the most frequently encountered ceramic type is sand-tempered Franklin Plain, a characteristic shared with most other Middle Woodland complexes east of the Mississippi Valley and south of the Fall Line (Wimberly 1960; Trickey 1957). Indigenous decorated types relate most strongly to Willey's Santa Rosa series, with Basin Bayou Incised and Alligator Bayou Stamped particularly in evidence. There is also a low, but persistent percentage of true grog-tempered Marksville material on Porter sites.

According to Griffin (1967), Porter Hopewell is found on the Gulf Coast in the vicinity of Mississippi Sound and up the Pascagoula and Tombigbee rivers. It does not appear to extend to the north much farther than the location of the McRae Mound in Lauderdale County, Mississippi, about one hundred miles north of Mobile Bay. The economic pattern is not well defined at this point, but probably shows some diversity between coastal and riverine environments. Sears (1964, p. 267) notes that shell middens are a common type of habitation site in the area, which would again suggest a basic tie to the Gulf Coast. However, the distribution of burial mounds, in contrast to Swift Creek, does not seem to bespeak a major emphasis on the marine environment (Figures 1 and 2, Table 6). The three mounds reported for the area are all well away from the coast and oriented in a roughly linear pattern from southeast to northwest.

Jennings (1941) originally defined the "Miller Complex" as a temporal sequence of three ceramic assemblages in northeast Mississippi. Subsequent work has done much to blur the initially clear-cut boundaries between Miller I, II, and III assemblages. A number of ceramic types considered temporally restricted by Jennings are now known to span a considerable time range; Saltillo Fabric Marked and Baldwin Plain, for example, appear to have been made for at least six hundred years (Jenkins 1975, p. 165).

Despite the complexities of the ceramic sequence, it is clear that peoples indigenous to the area participated in the Hopewell Interaction Sphere during late Miller I and early Miller II. The beginning of this period is marked by the addition of Furrs Cordmarked as a major type in local assemblages predominantly composed of Saltillo Fabric Marked and Baldwin Plain. A similar phenomenon apparently took place at this time in the Southern Appalachian area with the addition of Candy Creek Cordmarked and/or Flint River Cordmarked (these types are very similar) to Long Branch Fabric Marked—Mulberry Creek Plain assemblages, and perhaps both cases represent increased "northern influence" at this time (see Caldwell 1958, p. 32). In any case, the three Miller types are all sand-tempered, and this represents one of the most northerly penetrations of this type of ceramic complex in the East. Vessel shapes, particularly the T-shaped rims present on Baldwin Plain, also suggest a connection with the Gulf Coast (see Cotter and Corbett 1951, Plate 1). This southern affiliation is further reflected in the presence of Alexander series ceramics in early Miller I contexts and such Gulf Coast types as Alligator Bayou Stamped, Porter Zoned Incised, and Santa Rosa Punctate with later Miller I material; that is, there is a continuous and relatively intense contact both in terms of manufacturing concepts and trade up the Tombigbee from the Gulf Coast for much of the Early and Middle Woodland periods (Cotter and Corbett 1951, p. 54; Jenkins 1975, pp. 180-81).

In addition to this general Gulf Coast caste, there are suggestions of wide-ranging, but limited cultural contact with other regions. The dominant Miller projectile point, for example, is the Gary point (Jenkins 1975, pp. 180-81), a type with a variety of names, but that is generally considered more typical of the Havana and Crab Orchard traditions to the north. Bladelets, some of which are of Flint Ridge flint, have been reported from Miller sites (e.g. Bohannon 1972, pp. 60-61), but it is not yet clear whether they represent a local industry. The presence of bladelets of northern cherts is a geographically widespread, but infrequent, feature of Hopewell in the South. Limestone-tempered ceramics have been found in the northeastern portion of the Miller region in association with the dominant sand-tempered ware, and it has been suggested that they represent local products rather than vessels traded into the area from the Tennessee Valley (Bohannon 1972, p. 48; Jenkins 1975, p. 182). Marksville pottery also appears consistently on Miller sites, albeit in low densities, and it is clear that it represents an intrusive element. The overall impression of Miller Hopewell is one of a complex strongly tied to the Southeast, but with an overlay of characteristics derived from other areas. This kind of cultural amalgamation might be expected in an area located on major axes of communication connecting more "progressive," more populated regions.

Several types of Miller sites have been identified, including base camps and smaller transitory camps, a pattern indicating seasonal movement and the exploitation of a wide variety of resources. There is an increased evidence of musseling at this time, and this, together with hunting and possibly agriculture, constitutes a major portion of the subsistence base (Jenkins and Curren 1975, pp. 29-30).

The spatial distribution of Miller Hopewell has never been well worked out, but recent work has significantly expanded the boundaries suggested by Griffin (1967). The implications of this new range are important, especially in terms of clarifying the relationship between Miller and Porter. To the north, there is apparently a major Miller component at the Pinson site which lies across Pontotoc Ridge in the Mississippi Valley (Broster 1975). A number of sites have been found on the Tallahatchie, a tributary of the Yazoo, that have produced pottery with sand temper or "sand texture," and Griffin places them in Miller. However, Phillips (1970, pp. 891-92) argues on a variety of grounds that this material should be classified as Marksville. With the exception of the Womack Mound, it appears that Phillips's position is the better supported, thus limiting the extent of Miller to the west. It is to the south, however, that the expansion of Miller Hopewell has greatest significance. Recent work by Jenkins and others has extended the known distribution of Miller sites down the Tombigbee at least as far as Hale and Greene counties, Alabama (Jenkins 1975; Jenkins and Curren 1975). Thus, less than fifty miles currently separate the southern extent of Miller from the northern extent of Porter. Researchers in the area feel that at some point in this portion of the central Tombigbee, somewhere between Marengo and Clarke counties, Alabama, Porter and Miller I-II should overlap (N. Jenkins, personal communication). As an alternative, it is suggested here that Porter and Miller I-II may not exist as separate entities and that these divisions have resulted from investigating the extremes of what is essentially a spatial continuum of Middle Woodland occupation in the Tombigbee drainage. Upstream there is simply increased evidence of contact of what is essentially a coastal ceramic tradition with inland areas, particularly the Tennessee Valley. For purposes of this analysis the Tombigbee drainage is viewed as containing one major regional tradition at the time of Hopewell interaction rather than two.

TABLE 6. EXCAVATED HOPEWELL MORTUARY SITES IN THE MILLER-PORTER AREA

Site	Location	Map Number (see Figure 3)	Major References
Miller	Lee Co., MS	90	Jennings 1941
Bynum	Chickasaw Co., MS	91	Cotter and Corbett 1951
Pharr	Tishomingo Co., MS	92	Bohannon 1972
Womack	Yalobushia Co., MS	93	Koehler 1966
McRae	Lauderdale Co., MS	94	Collins 1926
McQuorquodale	Clark Co., AL	95	Wimberly and Tourtelot 1941
Jackson	Clark Co., AL	96	Moore 1905
Pinson	Madison Co., TN	221	Broster 1975

THE LOWER MISSISSIPPI VALLEY TRADITION—HOPEWELL HORIZON

The concept of a Lower Mississippi Valley tradition emphasizes the basic continuity evidenced in the area over a considerable time span (Sears 1964, p. 265). Within this tradition, a well-defined Hopewell horizon known as "Marksville" is present.

As a consequence of his excavations at the Marksville site in 1933, Frank Setzler was the first to recognize a strong stylistic relationship between the ceramics found in this central Louisiana area and the pottery recovered from Ohio Hopewell sites. Subsequent excavation and survey resulted in the realization that Marksville was a much more widespread phenomenon than Setzler originally envisioned. It has in fact come to be nearly synonymous with Hopewell in the Southeast and continues to occupy the attention of a good many archaeologists. Most of this attention, for good or evil, has been focused on the definition of ceramic types and the establishment of chronological sequences. As a result local temporal and spatial relationships are probably more clearly worked out here than in any other comparable area in the eastern United States on this time horizon. The available data on subsistence and settlement patterns are possibly among the worst.

Marksville can be viewed as principally a local development out of Tchefuncte-Alexander (Phillips 1970, pp. 569-70; Greengo 1964, p. 112). There is considerable continuity here, both in terms of manufacturing considerations (e.g. chalky paste, grog temper) and major stylistic elements (e.g. red filming, zoning, rocker stamping, cord-wrapped dowl impressing, scallop impressing, and punctation). Marksville apparently begins to concretize as a recognizable cultural complex sometime around 100 B.C. and continues until about A.D. 300 when it is gradually replaced by Baytown (Phillips 1970, pp. 960, 956-57).

Following Phillips (1970), Marksville can be subdivided into early and late periods. The early period, coincident with Phillips's Anderson Landing phase in the Yazoo Basin, extends from approximately 100 B.C. to A.D. 100. Of considerable significance here is the development of Marksville Stamped and Marksville Incised ceramics, with the associated "raptoral bird" motif and classic "Hopewell rim." Other early Marksville modes include zoned, cord-wrapped stick decoration, crescent dentate stamping, a "dot and dash" rim, and the bisected circle motif. In addition to Marksville Stamped and Incised, types of some importance associated with early Marksville include varieties of Catahoula Red Zoned, Withers Fabric Impressed, and possibly Jaketown Simple Stamped. With the beginning of the late period about A.D. 100, which is often referred to as Issequena, new modes are apparent on both Marksville Incised and Marksville Stamped, and they reflect an increased communication of stylistic concepts with the Gulf Coast. The emphasis on the bird design and Hopewell rim is replaced by complex "post-classic" geometric surface decoration and plain rims (see Phillips 1970, Figures 404 and 412). Plain red ware (Larto Red), fingernail punctation (Evansville Punctated), and the T-shaped and/or "Arcadia" rim are also apparently introduced at this time. The distinctive pattern of incising on Phillips's Marksville Incised variety Steele Bayou has an obvious and close connection with the Basin Bayou and Crystal River Incised types of the Gulf Coast, and Marksville Incised varieties Leist and Spanish Fort bear a close similarity to Willey's Indian Pass type (Phillips 1970, pp. 113-17). A number of the complex incised designs that are associated with Issequena appear to be structural reiterations of Gulf Coast concepts, specifically complicated stamping (Phillips 1970, p. 113). The tendency for decoration to be limited to bands above the shoulder also finds parallels in late Swift Creek (see Phillips 1970, p. 124). Although present in early Marksville assemblages, it is not until Issequena that Baytown Plain begins to emerge as a dominant type, a trend that continues in the subsequent Baytown period. Other types that apparently bridge this temporal division within Marksville include Indian Bay Stamped, Charupa Punctate, and Mulberry Creek Cordmarked.

The spatial distribution of Marksville ceramics is definitely centered in the Lower Mississippi alluvial valley (Phillips 1970, Figure 444; Gibson 1970; Toth 1974). Phillips's work in the Yazoo Basin has done much to clarify the distribution of this material on the eastern margin. Sites with Marksville components have been found as far south as the shores of Lake Pontchartrain and the adjacent Gulf Coast where some early Marksville material occurs in the upper horizons of predominantly Tchefuncte shell middens (Phillips 1970, p. 898). To the west, Marksville is found up the Red River into what is now the extreme northwest corner of Louisiana and into east Texas along the Neches and Sabine rivers. In the Mississippi Valley, Marksville becomes extremely attenuated above the mouth of the St. Francis River. Despite this fact and on the basis of meager evidence, Phillips extends the distribution of Marksville up to the mouth of the Ohio and divides the area in question into two phases, LaPlant and Turnage. Following Griffin (1967; see also Griffin and Spaulding 1952), the present study places the LaPlant material with Crab Orchard rather than Marksville. The Turnage phase is also difficult to picture as Marksville, especially in the absence of any decorated sherds. This taken together with Phillips's (1970, p. 887) description of the "sandy-textured" ceramics from this area suggest that this material may be more closely aligned to Miller than Marksville. It would appear on the basis of the presently available evidence that this area was not intensively occupied when compared with regions to the north and south. Phillips (1970, p. 887) contends that this simply reflects a lack of work. It is interesting to note, however, that in the St. Francis drainage immediately to the west, an area where a good deal of work has recently taken place and that has major Late Woodland and Mississippian occupations, Hopewellian exploitation appears to have been minimal (D. Morse, personal communication).

A comparison of the distribution of Marksville mortuary sites with the distribution of Marksville ceramics suggests that the ratio of mortuary sites to effective cultural space is quite low (Figure 1). Further, these sites appear to be relatively dispersed over the region. The greatest concentration is at the mouth of the Red River in the vicinity of the Marksville Prairie, an ideal location, according to Toth (1974, p. 4), for the exploitation of a variety of environmental zones.

The emphasis on ceramics, chronology, and to a lesser extent, burial ceremonialism, has contributed to a rather biased view of Marksville culture. Data on subsistence, subsistence technology, and settlement pattern are very scarce. Three dart point styles have been recognized as associated with Marksville—Edwards, Ellis, and Mabin, the latter a variant of the widely distributed Gary type. Bladelets and polyhedral cores are conspicuously absent from most discussions of Marksville, but Brookes (1975, pp. 14-15) seems to suggest that they are rather common. Phillips (1970, p. 542) appears to be quite correct in stating that our present knowledge of Marksville lithics makes any interpretation of these materials "palpably ridiculous." It has been suggested that most Marksville habitation sites were located close to the main channel of the Mississippi and that this pattern suggests that local subsistence was dependent on "point bar agriculture" (Belmont 1967; Gagliano 1967), but any direct evidence for this is totally lacking. The excavated Marksville mortuary sites used in this study are listed in Table 7.

Crab Orchard Tradition—Hopewell Horizon

In the hill country of southern Illinois and adjacent portions of Missouri, Indiana, Kentucky, and Tennessee there is a Woodland complex that has come to be known as the Crab Orchard tradition (Struever 1964, pp. 91-92; Winters 1967, p. 49). Within this tradition, the period of local participation in the Hopewell Interaction Sphere is marked ceramically by the transition from grit to grog tempering, the addition of rim nodes, and the thinning of vessel walls (Winters 1967, pp. 50-51). Most prominently associated with this period is the type Crab Orchard Fabric Impressed (Maxwell 1951, pp. 274-75), actually something of a misnomer since the "fabric" impressions are probably the result of using a cord-wrapped paddle edge rather than actual fabric. Other Crab Orchard series types associated with the "fabric-impressed" material on this temporal horizon include Crab Orchard Cordmarked and Crab Orchard Plain (Maxwell 1951; Winters 1967). The typical vessel form here is a fairly thick-walled, large, flat-bottomed jar.

TABLE 7. EXCAVATED HOPEWELL MORTUARY SITES IN THE MARKSVILLE AREA

Site	Location	Map Number (see Figure 3)	Major References
Helena	Philips Co., AR	99	Ford 1963
Marksville	Avoyelles Parish, LA	100	Toth 1974
Crooks	LaSalle Parish, LA	101	Ford and Willey 1940
Bellevue	Bossier Parish, LA	102	Fulton and Webb 1953
Anderson's Ldg.	Sharkey Parish, LA	103	Moore 1908
Dorr	Coahoma Co., MS	104	Peabody 1904; Phillips 1970, p. 888
Mayer	Avoyelles Parish, LA	105	Moore 1912
Briar Bend	Red River Parish, LA	106	Moore 1912
Saline Pt.—upper	Avoyelles Parish, LA	107	Moore 1912
Trammel	Yazoo Co., MS	108	Phillips 1970
Alma Brown	Desha Co., AK	109	Lemley and Dickson 1937
Coral Snake	Sabine Parish, LA	110	McClurken *et al.* 1966
Jonas Short	San Augustine Co., TX	111	Jelks 1965
Saline Pt.—lower	Avoyelles Parish, LA	112	Moore 1912
Grand Gulf	Claiborne Co., MS	113	Brookes 1975
Moncla Ferry	Avoyelles Parish, LA	114	Gibson 1970; Moore 1912
McCarter	Panola Co., MS	205	Johnson 1969; Griffin *et al.* 1970

In addition to the Crab Orchard series material, there is also a finely made "Hopewell ware" associated with sites of this regional complex. Maxwell (1952, p. 185) is of the opinion that this minority type is the result of direct trade from the Illinois Valley. Since many of the "Hopewell ware" sherds from Twenhofel, Hubele, Weber, and probably also LaPlant are grog- rather than limestone-tempered, however, it is reasonable to assume that much of this material was locally produced. Joseph Caldwell, at the time of his death, was in the process of defining new types on the basis of this material, one of which was to be called Twenhofel Incised (Caldwell n.d.; see also Winters 1967, p. 50).

The Crab Orchard lithic industry includes both Dickison Broad Bladed knives (a Gary variant) as well as the various Snyders forms (see Montet-White 1968 for type descriptions). Hoes and hoe resharpening flakes, often out of local Kaolin chert, are common. Bladelets of heat-treated Burlington, Kaolin, and Golconda cherts were produced in quantity.

The division of the Middle Woodland portion of Crab Orchard into finer temporal subdivisions is severely handicapped by the small amount of systematic work that has been done in the area. There are no published studies that document changes in ceramic modes through time on the basis of stratigraphic evidence nor are there many radiocarbon dates from the area that relate to the period of Hopewell interaction. Winters (1967, pp. 51-52; see also Stephens 1974, p. 35), however, suggests at least two phases that relate to this time period. His "Early Middle phase" is marked by the presence of Havana ware sherds, including Netler Stamped, in local assemblages and is dated from 200 B.C. to A.D. 1. His "Hopewellian Phase," which is presumably marked by the introduction of Hopewell ware, is dated from approximately A.D. 1

to A.D. 500. In practice this may not be a particularly easy division to make since most types of Havana ware, including both Netler and Naples Ovoid, continue to be produced well after A.D. 1 (Griffin *et al.* 1970, pp. 9, 96; White 1968, p. 125). Thus, Winters's temporal phase markers are not in all cases sufficiently diagnostic.

Related to this problem of chronological control in the Crab Orchard area during Middle Woodland is the presence of habitation sites that have obvious Hopewellian affinities but that produce ceramics that are difficult to relate to the local ceramic tradition as it is currently defined. The most important site in this category is the large and extremely complex Mann Site located in the Wabash Lowlands of southwestern Indiana (Adams 1949; Kellar 1973, p. 46). The Kaegi Site (Fowler 1957, pp. 38-41), the recently excavated Kuester Site (G. Apfelstadt, personal communication), several sites in northwestern Kentucky (Hoffman 1966), and a number of small sites along the lower Wabash (Green 1974, pp. 175-76; Stephens 1974, pp. 18-19; M. Seeman, unpublished research) also fall within this category. Typical of this type of site is the virtual absence of the "diagnostic" Crab Orchard Fabric Marked type and the presence of grog-tempered, relatively thin-walled, cordmarked globular jars. These often exhibit notched or "piecrust" rims. It should be noted at this point that the abandonment of fabric marking and the increased prevalence of cordmarking are trends noted in several regional ceramic traditions in the Midwest and Middle South where they mark a transition from early to late Middle Woodland.

Other ceramic types as well as the lithic industry serve further to distinguish sites of this complex from Crab Orchard assemblages found at such sites as Twenhofel and Hubele. A "decadent" Hopewell ware, complicated and simple stamped pottery, and a red painted type, the latter often with a Brandenberg or "T-shaped" rim, are also associated with the ceramic industry. Much of this is grog-tempered, but limestone tempering is also fairly common. Importantly, Lowe-flared base projectile points (Winters 1967) rather than Snyders points are associated with this "Mann complex." Lowe-flared base points are a well recognized late Middle Woodland to early Late Woodland index fossil over much of what is now the mid-continental United States. In fact, the entire complex seems to bear a closer resemblance to the early Late Woodland Allison–Lamotte assemblages of the central Wabash than to any other currently defined manifestations in the area.

All of this evidence would seem to indicate that this material is somewhat more recent than what is currently recognized as Crab Orchard Middle Woodland. This is borne out by the radiocarbon dates at Kuester, both of which fall in the latter half of the fourth century. The problem then would seem to be one of deciding on the basis of scanty evidence if this material constitutes an intrusive element into the area or if it is simply an evolved, late Middle Woodland Crab Orchard. For purposes of this study, it is argued that although there are certainly a number of externally derived characteristics in this complex, it can best be viewed as primarily an *in situ* development within the local tradition rather than resulting from migration or invasion. This position is supported by the fact that in many other areas where there is better stratigraphic and chronological control, the transition from Middle to late Middle Woodland, and eventually to early Late Woodland, appears to be principally a local process and is marked by the kinds of changes seen between what has been called Crab Orchard and the later "Mann complex" material. Of particular relevance here are such regional sequences as Marksville-Baytown, Scioto Hopewell-Newtown, McFarland-Owl Hollow, and Havana-Jersey Bluff.

The spatial distribution of Crab Orchard is perhaps somewhat more clearly worked out than the chronological sequence. Sites associated with this tradition appear concentrated in the Shawnee Hills and southern portion of the Mount Vernon hill country. This would include the valleys of the Big Muddy and Cache rivers in southern Illinois, as well as the lower Wabash drainage and adjacent portions of the Tennessee and Ohio valleys (see Struever 1964, p. 86). Although there does not appear to be a great deal of Hopewellian material up the Ohio River above the mouth of the Wabash, most of what is found appears to relate to Crab Orchard rather than other regional traditions (Green n.d.; Kellar 1956; Seeman 1975). The Crib Mound in Spencer County, Indiana, has a strong Crab Orchard component. It is interesting to note that the northeastern limit of Crab Orchard is also the approximate northeastern limit of the later Middle Mississippian adaptation.

To the north, Crab Orchard does not appear to extend any further than the mouth of the Kaskaskia River in the Mississippi Valley or the mouth of the White River in the Wabash Valley (Winters 1967, p. 50). It should be noted that this does not correspond to Griffin's (1967) distributional map which would extend Crab Orchard to include both the Kaskaskia drainage and the central Wabash. On the basis of recent surveys (e.g. Tomak 1970; Winters 1967, p. 50), it is now known that the central Wabash and White River valleys relate to the Havana tradition rather than Crab Orchard. In this regard, it should be noted that such sites as Purgatory and Gamble are not Crab Orchard, as Griffin suggests, but Havana. Also, Griffin's location of both the Hubele and Wilson sites is considerably north, by as much as fifty miles, of their true locations. In the central Kaskaskia, excavations by Perino (n.d.) and Gardner (1968) indicate that this area is also primarily of Havana affiliation. As has been noted previously, Phillips's LaPlant phase of Marksville is on the basis of the diagnostic Crab Orchard series material placed within the latter tradition.

Crab Orchard settlement-subsistence patterns suggest an orientation toward the exploitation of both riverine and upland resources. Struever (1964, pp. 96, 92) notes that the northern boundary of this tradition during Middle Woodland is coincident with the northern limit of the oak-hickory forest, a resource zone that no doubt played an important part in local subsistence and also states that habitation sites are larger and more frequent than during earlier periods. Winters (1967, p. 51) documents a change in the location of major habitation sites from a diversity of physiographic settings to the first terrace (T-1) of the larger valleys and implies that this relates to an increased dependency on cultigens. Recent excavations by Cremin and Apfelstadt have confirmed the limited utilization of cultigens and "pseudo-cultigens" by Crab Orchard groups, a pattern more adequately documented in the Havana region to the north (Struever 1968). Southern Illinois University's recent work in the Cedar Creek drainage, however, points out that Crab Orchard differs importantly from the Havana tradition in placing a much greater emphasis on the seasonal exploitation of upland resources, particularly nuts, as is evidenced by the establishment of small, transitory camps in these localities (McNerney 1976). This appears to have been a general adaptive pattern for Middle Woodland peoples living in the unglaciated portion of the Middle South. Eight mortuary sites are included in this analysis that relate to the Crab Orchard tradition (Table 8).

HAVANA TRADITION—HOPEWELL HORIZON

The use of "Havana" as a major classificatory division came about as a result of the First Havana Conference in Carlyle, Illinois, in 1962. The most important characteristic of this newly defined tradition was the spatial and temporal continuity of those pottery types that had originally been included by Griffin (1952) in his definition of Havana ware, a grit-tempered, relatively thick earthenware. Typical vessel forms included large globular jars and small pots. Specific types defined by Griffin include Naples Stamped, Hummel Stamped, Steuben Punctate, Victory Brushed, Havana Plain, Fettie Incised, Netler Stamped, Havana Plain, and Havana Cordmarked. It should be noted that these types are not necessarily mutually exclusive since some of them are based on rim decorative modes while others relate directly to body decoration. Thus, for example, it is quite possible to have a Naples Stamped rim on either a Havana Zoned or a Havana Cordmarked body.

Associated with Havana ware over much of its distribution is a finer, more carefully constructed "ceremonial" ware that has come to be known as Hopewell ware (Griffin 1952). In contrast to Havana ware, Hopewell ware was typically limestone-tempered. A greater variety of vessel forms were also manufactured, including bowls and compound jars. Hopewell ware quite clearly constitutes an intrusive element into Havana culture, and it is argued that the origin of this material can be found in the

TABLE 8. EXCAVATED HOPEWELL MORTUARY SITES IN THE CRAB ORCHARD AREA

Site	Location	Map Number (see Figure 3)	Major References
Twenhofel	Jackson Co., IL	115	Maxwell 1952, p. 185; Caldwell n.d.
Rutherford	Hardin Co., IL	116	Fowler 1957
Hiser	Jackson Co., IL	117	Hoffman 1960
Vogel	Jackson Co., IL	118	Thomas 1894, pp. 143-44
Wilson	White Co., IL	119	Neumann and Fowler 1952
Mann	Posey Co., IN	120	Adams 1949
Hubele	White Co., IL	220	Neumann and Fowler 1952
Crib	Spencer Co., IN	226	this report

Marksville pottery of the lower Mississippi Valley. Phillips (1970, pp. 120, 111) proposes in fact that the various types of Hopewell ware should be considered as local varieties of the major Marksville types defined farther to the south. While there is a certain merit to this suggestion on the basis of the many shared decorative elements, the fact remains that the Hopewell ware of the Midwest differs from the Marksville material precisely along those dimensions necessary to segregate ceramic wares; that is, they can be shown to differ in paste and temper as well as the overall quality of the product. The craftsmanship exhibited in most Hopewell ware of the Havana area definitely surpasses that evident in Marksville ceramics. Although no detailed physiochemical studies have been done, it is generally accepted on the basis of a distribution/density argument that much of the Hopewell ware found in the Havana region was produced in the lower Illinois Valley (Griffin *et al.* 1970, p. 8).

Griffin (1952) originally defined nine major types of Hopewell ware and they continue to be the classificatory divisions in use today. As with the Havana types, these are "sherd types" and are not necessarily mutually exclusive on a given vessel. Major types include Hopewell Zoned Stamped, Hopewell Rocker Stamped, Hopewell Red Filmed, Hopewell Zoned Red, Hopewell Negative Painted, Hopewell Plain, Brandenberg Plain, Montezuma Punctate, Baehr Brushed, and Baehr Zoned Punctated.

In an attempt to extend the list of definitive characteristics beyond ceramics, participants in the various Havana conferences have attempted to recognize a distinctive lithic complex as well. In this context, Winters and Hammerslough (1971, p. 139) mention the importance of Snyders and Dickson projectile points, the rectangular Havana scraper, lamellar blades of distinctive proportions, angled or V-based platform pipes, rectangular hoes, and "Casper the Ghost" figurines. They also note the addition to this complex of stemmed projectile point types in later Havana contexts. Most of these characteristics, however, can be shown to have distributions that are not necessarily correlated with the distribution of Havana ceramics.

The several temporal sequences that have been worked out for the Havana area are based largely on correlating radiocarbon dates with changing ceramic modes (e.g. Griffin *et al.* 1970; Struever 1964; Winters and Hammerslough 1971). Despite the fact that none of these chronologies coincide exactly, several major trends are apparent. For example, there is general agreement that Havana developed locally out of the Early Woodland Morton Culture of the central Illinois Valley. With the beginning of the earliest Havana phases about 200 B.C., Morton Incised evolves directly into Fettie Decorated. Two other decorated types, Netler Stamped and Havana Zoned are also invented at this time, and they apparently continue to be manufactured for a considerable period of time. A plain rim band, however, is apparently a good "early" time marker for these types (Griffin *et al.* 1970, p. 9; Montet-White 1968, p. 111). The predominant type in assemblages that date to this phase, however, is Havana Plain. About 100 B.C. rim nodes are added to all types of Havana ware which by this time also included

Naples Ovoid, Naples Stamped, and Naples Dentate. Fettie Decorated (originally known as Fettie Incised) has apparently declined substantially. Importantly, evidence from the Pond Site in the central Illinois Valley indicates that the characteristic Hopewell blade and core technology was also introduced or invented at about this time (Winters 1971, p. 152). The wide variant of the Snyders point was also being manufactured. This period marks the beginning of participation in the Hopewell Interaction Sphere.

Coinciding roughly with the middle of the Havana sequence, or about A.D. 1-200, several notable changes are evident in local assemblages. Naples Ovoid and Netler Stamped decline in popularity. Havana Cordmarked increases in frequency at the expense of Havana Plain, a trend that continues for the rest of the period (Powell 1957, p. 223; Winters and Hammerslough 1971, p. 141). More important, however, is the introduction of Hopewell ware. It would appear that Hopewell Zoned Stamped, Hopewell Rocker Stamped, Hopewell Plain, and Montezuma Punctate appear to have been adopted early in this period and as a complex. Two decorative (and quite probably symbolic) motifs, the cross-hatched "Hopewell rim" and the "raptoral bird" appear frequently associated with these types at this time. The temporal position of such types as Hopewell Negative Painted and Hopewell Red Filmed is not entirely clear, but on the basis of evidence from the Southeast, it is quite likely that these types were not introduced with the initial appearance of Hopewell ware.

Subsequent to A.D. 200 several trends become evident in the Havana area that mark the transition from Middle to Late Woodland and, by extension, the end of the Interaction Sphere. Hopewell ware, for example, undergoes a noticeable devolution. This is evident both in the actual manufacture of the vessel as well as in the execution of the decoration. With regard to the latter, there are several trends that should be noted. The Hopewell rim is replaced by a greater variety of rim decorations, and the bird motif is replaced by simple geometric patterns. Unzoned rocker stamping, often sloppily executed, increases in frequency at the expense of the more carefully made zoned treatments. A distinctive incised band above the shoulder that plunges to separate the lobes of a vessel appears to be a new motif (see, for example, Griffin *et al.* 1970, Plates 67 and 68). There is also an increased use of brushed surface treatments. To segregate ceramics exhibiting the above characteristics from other types of Hopewell ware, Griffin (1952) defined the types Baehr Brushed and Baehr Zoned Punctate, although at the time he may not have been fully aware of the chronological implications.

There are at least two other important stylistic changes that relate to this late Havana period. Lowe-flared base points (Winters 1967), also called Steuben Stemmed (Morse 1963), are introduced into local assemblages at this time and continue to be produced well into Late Woodland. It should be noted that this point style under a variety of local names has a very widespread distribution in the Midwest and Middle South at this time. Secondly, the regional homogeneity of Havana ware begins to break down rapidly, and a number of distinct, local Late

Woodland ceramic wares begin to develop out of this Havana base. Thus, in the central Illinois Valley this transition is marked by the evolution of early Weaver ware and in the lower valley by the development of the Jersey Bluff Canteen series (Griffin 1952; Griffin *et al.* 1970, pp. 1-10).

Just as the temporal sequence of the Havana tradition has been comparatively well worked out, so too have the spatial limits. To the south, Havana extends to the Kaskaskia drainage; sites such as Jasper-Neuman (Gardner 1968) and Kraske (Perino n.d.) clearly have strong Havana components. Eastward from this drainage, the southern boundary of Havana can be traced across southern Illinois to the central Wabash Valley. According to both Winters (1967, p. 37) and Denzil Stephens (personal communication), Havana gives way to Crab Orchard south of the confluence of the Wabash and White rivers. Winters (1967, p. 46) was inclined to view the presence of Havana in the Wabash Valley as relatively short-lived and localized near the mouth of the Embarrass. Additional information has served to extend this distribution considerably. Stephens (personal communication) reports finding Havana material up the Embarrass to the point where it crosses the Shelbyville moraine, and this would appear to parallel closely the distribution of later Allison-LaMotte sites in this drainage. A scattering of Havana material also apparently extends up the White River Valley to at least Greene County, Indiana (Tomak 1970, p. 108). Further, recent survey and excavation by Indiana State University has resulted in the extension of the known limits of the Havana occupation of the Wabash Valley well to the north of the area surveyed by Winters. Sites have been found with some frequency at least as far north as Parke County, Indiana (R. Pace, personal communication). Approximately sixty miles upriver a substantial Havana habitation site has recently been located at the mouth of the Tippecanoe, and there are other smaller sites in the vicinity. Based on the lack of survey in this portion of the Wabash Valley, it is likely that Havana exists in the intervening areas as well. Thus, the addition of new data has served to unite Winters's apparently isolated Havana manifestation at the mouth of the Embarrass with the Havana occupations known to exist to the north along the Kankakee and to the west along some of the smaller tributaries of the Illinois and Mississippi.

Quimby's (1941) "Goodall Focus" is now clearly recognized as a regional expression of the Havana tradition (Griffin *et al.* 1970, p. 9). Sites of this complex have been found as far north as the Muskegon Valley in western Michigan and Saginaw Bay in eastern Michigan (Fitting 1968; 1970). North of this latitude, Havana is quickly replaced by the Laurel tradition of the lake-forest area. From the Muskegon Valley, Havana manifestations can be traced eastward across Lake Huron to the upper Mississippi Valley, thus including at least the lower drainages of such southerly flowing streams as the Rock, Wisconsin, and Black rivers (Griffin 1967). It should be noted that this upper Mississippi Valley manifestation, often referred to as "Trempealeau Hopewell" (McKern 1931), is quite distinctive, and there is some question as to the nature of its relationship with more "typical" Havana expressions. The ceramics, for example, incorporate a number of decorative elements that do not have close parallels in areas to the south or east. Similarly, certain projectile point forms are apparently limited to this area. However, following Struever (1964) and emphasizing the similarities rather than the differences, this complex is included in the Havana tradition. Howard Lake (Wilford 1941) and Red Cedar (Cooper 1933) would thus appear to lie on the extreme northwestern boundary of the Havana distribution.

The Mississippi Valley forms a fairly well defined western boundary for most of the Havana area. The major exception to this generalization is the penetration up the Missouri River to about what is now the Kansas-Nebraska border (Chapman 1968; A. Johnson, personal communication; Bell and Baerreis 1951). There has been a tendency in the past to view both "Kansas City Hopewell" and "Cooper Hopewell" as relatively isolated phenomenon, but more recent work has not only documented the cultural similarities of these areas with Illinois, but has physically connected them through additional survey and excavation of Havana sites along the middle and lower Missouri River (Chapman 1968; Brown 1965, p. 208). It is the conclusion of most researchers in the area that this Havana material is relatively late in the development of the tradition and represents a direct intrusion from the Illinois Valley.

There has been a considerable amount of work in the Havana area relating to subsistence-settlement patterns, particularly within the last decade. James Brown, one of the first researchers to work explicitly on this problem, recognized a high correlation between the distribution of the Havana tradition and the ecological province known as the Prairie Peninsula (1964; 1965). His work emphasizes the diversity of exploitable plant and animal resources available in this mosaic environment and suggests that this certainly contributed to the development of a distinct Havana adaptation. Subsequent studies have attempted to document further the rich environmental potential of this region (e.g. Munson *et al.* 1971; Zawacki and Hausfater 1969; Levine n.d.).

At the same time that Brown was engaged in research on the northern periphery of Havana, Stuart Struever was surveying and excavating a number of Middle Woodland sites in the lower Illinois Valley. His results led him to the recognition of several important regional patterns and ultimately to put forth a model explaining the development of the Hopewell Interaction Sphere. In increasing specificity, Struever (1964) suggests the importance of the following patterns. First, Havana sites are limited to areas with at least 140 frost-free days; this presumably represents the minimal requirements necessary for the growth of available cultigens. Second, Struever noticed an abandonment of secondary valleys and a concentration of sites in the larger valleys. The greatest concentration of any of these areas was apparently in the lower Illinois Valley. Third, he noticed that habitation was focused near shallow backwater ponds and stream banks and in close proximity to alluvial soils. Fourth, excavation of village sites such as Apple Creek and Newbridge revealed the utilization of weed seeds such as iva, amaranthus, chenopodium, and polygonum. From this evidence, Struever deduced that there was a major change in the subsistence base with the beginning of Middle Woodland and that the central feature of this change was the adoption of simple mud flat horticulture based on a variety of "Eastern Agricultural Complex" (Fowler 1971) plants. Struever further notes that the adoption of this new mode of subsistence across several geographic regions was responsible for local population increases and ultimately the development of the Hopewell Interaction Sphere. Additional work has supported Struever's contention that weed seeds were of some importance in local diet. Further it has failed to produce Mesoamerican cultigens on a scale that would indicate that they occupied anything other than a minor role in the subsistence base. A study by Munson (n.d.), however, indicates that those "crops" that are of central importance to the dump heap or mud flat horticulture hypothesis do not in fact grow very well in the floodplain contexts Struever has emphasized. Most of them do grow quite well on the talus slopes, however, precisely the area where most of the large habitation sites have been found.

An inspection of the distribution of major Havana tradition mound groups reveals several basic patterns. First, the lower Illinois Valley is the most densely settled portion of the region. The number of mortuary sites here is greater than any other area of comparable size at the time in eastern North America (Figure 1). Upriver the density of mortuary sites falls off gradually until a point is reached just below the present city of Peoria. Here there is a considerable decrease in the number of sites, although they continue to extend up the Illinois-Kankakee drainage and around the southeastern shore of Lake Michigan. In this latter area sites are not directly associated with the lake, but instead are found in the lower portions of the major tributaries. The Mississippi Valley does not seem to have been intensively occupied south of the mouth of the Rock River except in the immediate vicinity of the Illinois/Mississippi confluence. North of the Rock River, however, sites are relatively frequent and show some tendency to cluster near the mouths of major tributaries. The Wabash and Kaskaskia apparently supported fairly small populations, comparatively speaking, and the Missouri was an even more marginal situation.

TABLE 9. EXCAVATED HOPEWELL MORTUARY SITES IN THE HAVANA AREA

Site	Location	Map Number (see Figure 3)	Major References
Gracey	Macoupin Co., IL	121	Farnsworth 1973, pp. 23, 40
Pete Klunk	Calhoun Co., IL	122	Perino 1968
Gibson	Calhoun Co., IL	123	Perino 1968; n. d.
Lawrence Gay	Pike Co., IL	124	Perino n. d.
Joe Gay	Pike Co., IL	125	Perino n. d.
Steuben	Marshall Co., IL	126	Morse 1963
Peisker	Calhoun Co., IL	127	Struever 1968
Frederick	Schuyler Co., IL	128	Perkins 1965
Hood	Schuyler Co., IL	129	Morse 1956; personal communication

TABLE 9. EXCAVATED HOPEWELL MORTUARY SITES IN THE HAVANA AREA (Continued)

Site	Location	Map Number (see Figure 3)	Major References
Hannah	Peoria Co., IL	130	Morse and Morse 1965
Havana	Mason Co., IL	131	McGregor 1952; Baker *et al.* 1941
Naples	Scott Co., IL	132	Struever 1968
Dickison	Peoria Co., IL	133	Walker 1952; Bluhm 1960
Clear Lake	Tazewell Co., IL	134	Cole and Deuel 1937, p. 181; Fowler 1952
Weaver	Fulton Co., IL	135	Wray and McNeish 1961
Mohrman	Adams Co., IL	136	Mohrman 1949
Liverpool	Fulton Co., IL	137	Cole and Deuel 1937; Townsend 1956
Bedford	Pike Co., IL	138	Perino n. d.
Meppen	Calhoun Co., IL	139	Struever 1968; Fecht 1955
Ogden-Fettie	Fulton Co., IL	140	Cole and Deuel 1937
Carter	Greene Co., IL	141	Perino 1975; n. d.
Collins	Calhoun Co., IL	142	Struever 1968
Hagen	Calhoun Co., IL	143	Struever 1968; Perino n. d.
Helm	Pike Co., IL	144	Struever 1968
Hardin	Calhoun Co., IL	145	Struever 1968
Snyders	Calhoun Co., IL	146	White 1968; Titterington n. d.
Knight	Calhoun Co., IL	147	Griffin *et al.* 1970
Kamp	Calhoun Co., IL	148	Struever 1968; Baker *et al.* 1941
Brandenberg	Calhoun Co., IL	149	Baker *et al.* 1941
North	Clifton Co., IL	150	Perino n. d.
Meridosia	Morgan Co., IL	151	Struever 1968
Schafner	Pike Co., IL	152	Perino n. d.
Montezuma	Pike Co., IL	153	Struever 1968; Perino n. d.
Mound House	Greene Co., IL	154	Struever 1968
Pilots Peak	Pike Co., IL	155	Struever 1968; Perino n. d.
Swartz	Pike Co., IL	156	Struever 1968; Perino n. d.
Baehr	Brown Co., IL	157	Griffin 1941
Kraske	St. Clair Co., IL	158	Perino n. d.
L'Orient	Calhoun Co., IL	159	Perino n. d.
Homer Adams	Pike Co., IL	160	Perino n. d.
Hacker	Jersey Co., IL	161	Perino n. d.
Utica	LaSalle Co., IL	162	Henriksen 1965
Albany	Whiteside Co., IL	163	Herold 1971
Portage	JoDaviess Co., IL	164	Bennett 1945
Dunleith	JoDaviess Co., IL	165	Thomas 1894
Adler	Will Co., IL	166	Winters 1961
Davenport-Cook	Scott Co., IA	167	Farquarson 1876; Gass 1877; Putnam 1886; McKusick 1970
Toolesboro No. 1	Louisa Co., IA	168	Lynch *et al.* 1893; Harrison and Pratt 1893; Lindley 1876
Schwert	Trempealeau Co., WI	169	Griffin *et al.* 1970; McKern 1931
Shrake	Trempealeau Co., WI	170	McKern 1931
Courtois	Crawford Co., WI	171	Thomas 1894; McKern 1931
Flucke	Crawford Co., WI	172	Thomas 1894; McKern 1931
Sioux Coulee	Crawford Co., WI	173	Thomas 1894; McKern 1931

TABLE 9. EXCAVATED HOPEWELL MORTUARY SITES IN THE HAVANA AREA (Continued)

Site	Location	Map Number (see Figure 3)	Major References
Battle Island	Vernon Co., WI	174	Thomas 1894; McKern 1931
White	Vernon Co., WI	175	Thomas 1894; J. Freeman, personal communication
Perrot	Trempealeau Co., WI	176	McKern 1931
Wyalusing	Grant Co., WI	177	Thomas 1894; J. Freeman, personal communication
Cyrus Thomas	Barron Co., WI	178	Thomas 1894; Cooper 1933
Racine	Racine Co., WI	179	Lapham 1855; J. Freeman, personal communication
Outlet	Dane Co., WI	180	Bakken 1950
Norton	Kent Co., MI	181	Griffin *et al.* 1970; Quimby 1941
Converse	Kent Co., MI	182	Quimby 1941; 1944; Fitting 1971
Gratten	Kent Co., MI	183	McAllister 1932
Spoonville	Ottawa Co., MI	184	Flanders 1965
Summerville	Cass Co., MI	185	Quimby 1941
Brooks	Newago Co., MI	186	Quimby 1941; 1944
McNeal	Muskegon Co., MI	187	Quimby 1941
Marantette	St. Joseph Co., MI	188	Quimby 1941; 1944
LeCount	Porter Co., IN	189	McAllister 1932
Scott	St. Joseph Co., MI	190	Quimby 1941
Goodall	LaPorte Co., IN	191	Quimby 1941; 1944; Brown 1964
Union Mills	LaPorte Co., IN	192	Brown 1964
Upp-Wark	Porter Co., IN	193	McAllister 1932
Round Lake	Starke Co., IN	194	Lucas 1973
Melon Md. F	Newago Co., MI	195	Fitting 1970
Schultz	Bay Co., MI	196	Fitting 1968
Parsons	Newago Co., MI	197	Flanders 1965
Palmiteer	Newago Co., MI	198	Flanders 1965
Renner	Clay Co., MO	199	Wedel 1943
Taylor	Doniphan Co., KS	200	O'Brien 1973
Cogan	Platte Co., MO	201	Tjaden 1974
Cochran	Platte Co., MO	202	Larsen and O'Brien 1973
Babcock	Clay Co., MO	203	Wedel 1943
Merrigan	Cahoun Co., IL	218	Struever 1968
Worthington	Greene Co., IN	219	Collett 1880
Effigy Mds.	Alamakee Co., LA	222	Logan 1971; Beaubien 1953
Noten-Wiseman	Menard Co., IL	224	Deuel 1952; Griffin n. d.
Toolesboro No. 2	Louisa Co., IA	227	Lynch *et al.* 1893; Harrison and Pratt 1893
Toolesboro No. 3	Louisa Co., IA	228	Starr 1897
Hall's Place	Scott Co., IA	229	Starr 1897
Allens	Scott Co., IA	230	Pratt 1878
Buffalo Twp.	Scott Co., IA	231	Starr 1897
New Galena	Allamakee Co., IA	232	Orr n. d.
Slinde	Allamakee Co., IA	233	Orr n. d.
Hardy Dam	Newago Co., MI	234	Prahl 1966; Burnett 1966
Mercer	Mercer Co., IL	235	Griffin 1965; Gass 1883
F°455	Fulton Co., IL	236	Griffin 1965; Wray 1938
Terre Haute	Vigo Co., IN	242	R. Pace, personal communication

SUMMARY AND CONCLUSIONS

A research universe comprising eight major regional traditions has now been established, a necessary step before any analysis of interregional trade can take place. The regions are outlined in Figure 1. In a general sense, these various traditions correlate with the major ecological and physiographic features in the environment. The actual parameters of these traditions are somewhat different than those suggested by Griffin (1967). This is largely a consequence of additional field work in the area. No doubt future work will alter the distributional picture presented here, especially since some areas such as Kentucky are still poorly understood.

Two hundred and forty-one Hopewell mortuary sites have been identified within the various regions. Only one site, the Watkins mound (Figure 3, no. 204), seems to fall outside of these boundaries, and this no doubt simply reflects a lack of data on the local prehistory for this period. In general, these sites are closely correlated with riverine settings. Particularly strong concentrations are evident in the lower Illinois Valley, the central Tennessee Valley, and the Scioto Valley. This network of sites constitutes the structure within which Hopewellian interaction took place. It is assumed that this sample will prove of sufficient size and heterogeneity to provide reliable results for several hypotheses that will be tested in subsequent portions of this study regarding the nature of interregional trade.

The distribution of Hopewell sites within their various regional traditions, the "nodes" through which interregional commodities were traded, has now been outlined and attention is now turned to defining further the structure of the Interaction Sphere by parameterizing the availability and distribution of various raw materials. The basic question of whether Interaction Sphere commodities were traded primarily as finished artifacts or raw materials will also be addressed.

IV

INTERACTION SPHERE RAW MATERIALS

One of the objectives of this study is to delineate the nature of Hopewell interregional trading patterns. This is important, particularly as it relates to the interdependence and intensity of communication among various Middle Woodland peoples. The implications of stylistic copying in locally available raw materials are quite different, for example, from those suggested by the actual trade of finished products across major cultural regions. Attention is now focused on an intermediate level of the interactional continuum—the distribution and value of particular "exotic" raw materials. More specifically, it is important at this point to identify these raw materials, to locate their source (or sources) of origin, to determine their relative importance, and to interpret the cultural significance of particular distribution patterns.

Struever and Houart (1972) have provided an inventory of what they consider to be the major Hopewell Interaction Sphere raw materials. These twenty-eight materials include such commodities as obsidian, Knife River chalcedony, grizzly bear canines, meteoric iron, galena, gypsum, catlinite, crystal quartz, copper, hematite, cannel coal, mica, steatite, graphite, pyrite, pearls, alligator teeth, shark teeth, barracuda jaws, conch shells, Ohio pipestone, Flint Ridge flint, silver, Indiana hornstone, Kaolin chert, Burlington chert, Crescent Quarry chert, and Missouri chert. Six of these, including all of the major chert types, will not be dealt with in the present study. The proper identification of chert types is often a difficult business, and this in conjunction with the fact that information on chert types is not available for many of the earlier excavations contributed to a decision to exclude this information from subsequent portions of this analysis. This opportunity should be taken, however, to reinforce Griffin's (1975, p. 142) general impression that interregional trade in chert was so sporadic as to be of relatively minor importance. Also, it should be pointed out for the sake of clarification that in contrast to Struever and Houart's map (1972, p. 67), Indiana hornstone is not found along the current Indiana/Ohio border near Dayton, Ohio, but considerably to the southeast in the rugged Crawford uplands of southcentral Indiana (Seeman 1975). Further, Flint Ridge flint is not necessarily limited to central Ohio sources; outcrops and associated workshops have also been located near the Tremper Site considerably to the south (O. Prufer, personal communication).

Certainly the occurrence in archaeological contexts over a wide geographic area of so-called "exotic" raw materials has been viewed in the past as one of the basic characteristics of the Hopewell phenomenon. "Exotic" in this case is simply synonymous with an extraregional source of origin. Obviously, since some Hopewell communities were more proximal than others to particular resource areas, the "exotic" nature of those commodities, and by extension, their cost, exhibited some variability. Given aboriginal modes of transport and the nature of the materials, cost in this case can be seen as primarily a function of distance. Before any questions relating to cost, the relative importance of specific materials, or other questions of particular interest can be dealt with, however, it is important to identify the likely source areas. This is not in all cases an easy task for a variety of reasons. In particularly ambiguous situations, emphasis will be placed on sources that are within or in close proximity to localities known to have been inhabited by cultural groups participating in the Interaction Sphere. Some reliance will also be placed on the principle that many of these materials will tend to be found in greatest concentrations near the more important source areas. Struever and Houart (1972, p. 67) have mapped the locations of what they consider to be the major source areas for raw materials distributed through the Interaction Sphere, but fail to provide any references that relate to the source of their information. Consequently, it has been necessary to consult a number of primary sources to obtain these data. Results suggest a somewhat different distribution than the Struever and Houart study.

Making use of Struever and Houart's map as an initial point of reference, it is immediately clear that many of these raw materials share the same general source areas. This may be of some significance in analyzing patterns of Hopewell trade. It might be hypothesized, for example, that materials available in the same source area would share the same or similar distributions in archaeological contexts. Consequently, in the context of discussing potential source areas for each of these raw materials, a number of these more general resource zones will also be defined.

The Lake Superior uplands constitute one of the most important Hopewell resource zones. It is assumed to have been the major source of copper (Cu), one of the most widely sought after raw materials during the Middle Woodland period. Aboriginal mines or quarry pits have been located on Isle Royale, the Keweenaw peninsula, and on the eastern shore of Lake Superior near Hibbary Bay (Griffin 1961). On the basis of the currently available data, there is no direct evidence that Hopewell copper was derived from any other source area in the eastern United States (see Drier 1961; Bastian 1961). Struever and Houart (1972, p. 67) suggest that some copper might have been derived from deposits in the Rocky Mountain area.

Goad (1974) has recently argued on the basis of trace element analysis that some Middle Woodland copper was derived from southeastern sources, specifically from the ore deposits of Ashe County, North Carolina, and near Ducktown, Tennessee. Although no large surface outcrops or aboriginal quarry sites currently exist, Goad (personal communication) notes that both can be documented in the literature prior to 1860. Copper ore in the Southeast is generally not sufficiently pure to allow effective exploitation without smelting (Ross 1935, pp. 70, 101; Webb 1939, p. 19), but Goad (personal communication) argues that there are sources near Ducktown and elsewhere in the Southeast which could have been worked by cold hammering. Despite a general commitment to a southeastern source of aboriginal copper, Goad (personal communication) acknowledges that the amount of this metal available in the area would still be extremely small in comparison with the vast quantities of pure copper associated with the Lake Superior deposits.

A fourth potential source of copper is the Wisconsin and pre-Wisconsin glacial drift. Nuggets have been recovered from deposits in Indiana, Illinois, and Ohio and from as far south as the Ohio River (Salisbury 1885). The origin of most of this material is the Lake Superior region, and the distribution of these nuggets has in fact been used to document the southward advance of the Michigan lobe. However, it should be noted that the presence of copper nuggets in eastern Indiana and central Ohio would be difficult to attribute to this source and may represent transport from farther to the north (Leverett and Taylor 1915, pp. 63, 64; H. Gray, personal communication). From an archaeological perspective, the presence of isolated copper nuggets in till deposits suggests that this material could have been collected well to the south of the Lake Superior quarries. Given the relative intensity with which copper was utilized, however, it is safe to assume that the vast majority of Hopewell copper was collected at the primary source.

The distribution of copper suggests that it was extremely important in Hopewell trade. While the pattern of copper trading had certainly been established for several centuries, and would continue into historic times, the general impression is that more copper was traded at this time in the eastern United States than during any other comparable period. Very little of this is found at sites as unaltered nuggets, but rather was worked into a variety of ornaments, tools, and ritual paraphernalia.

Silver (Ag) is another Hopewell raw material of some importance. As with copper, the most probable source of this metal is the upland region bordering Lake Superior (Prufer 1961a, p. 358; Griffin and Quimby 1961, pp. 75, 80-81; Palache *et al.* 1944, p. 98). Here it is considerably less common than copper and thus from an economic standpoint more costly. It does, however, as a soft metal share a number of physical characteristics with copper. Both of these factors no doubt contributed to the fact that silver was manufactured into some of the same types of artifacts as copper, although the range of artifact classes is considerably reduced, particularly at the technological end of the spectrum.

Hematite (Fe_2O_3) is also a major raw material available in the Great Lakes uplands where it occurs in both the hard specular variety and the soft earthy form. The latter form will not be dealt with within the context of this investigation since it is inevitably reported as "red ochre," a general term for a red paint which was also produced from such minerals as limonite and siterite. In contrast to copper and silver, specular hematite cannot be cold hammered, but must be modified by a pecking and grinding technique. Although Shetrone (1926, p. 295) emphasized the similarity of some of the hematite found at the Hopewell Site to the Lake Superior material, it should be noted that material of very similar structure can be found elsewhere within the Interaction Sphere area. Struever and Houart (1972, p. 67), for example, locate a source in eastern Missouri. Presumably this is the same source described by Holmes (1919, pp. 266-70) near Lessley, Missouri, where numerous quarry pits have been found. A third important source of specular hematite occurs in westcentral Illinois near the town of Hardin (A. Tratebas, personal communication). Struever and Houart are apparently unaware of this latter source, and its presence does in fact considerably detract from the logic of their argument concerning the importation of Missouri hematite into the Illinois Valley and the location of the Snyders Site (see Struever and Houart 1972, p. 64). In any case, the important point here is that a minimum of three loci for the prehistoric extraction of hematite have been documented. Barring an ability at this point to discriminate among these source areas, it is impossible to assess accurately the relationship of archaeological occurrences to particular sources of origin. However, there does appear to be a concentration of this material at lower Illinois Valley sites, which would tend to strengthen the possibility that much of the hematite circulating through the Interaction Sphere was derived from this locality.

Struever and Houart (1972, p. 67) locate six potential source areas for gypsum ($CaSo_4.2H_2O$) in the eastern United States. Three of these are in the Great Lakes area. Actually, this is an oversimplification of the available data. Gypsum is one of the most common minerals in the eastern half of the continent. Additional sources of current commercial importance would also include, for example, deposits in New York, Iowa, and Indiana. Thus gypsum, like other commodities such as bear canines and pearls, seems to constitute a type of material possibly of some importance in the Interaction Sphere, but that is difficult to associate with a particular locality. With this type of material it becomes difficult to argue that it was necessarily a traded commodity since it was locally available to a wide variety of regional Hopewell manifestations.

Struever and Houart (1972, p. 67) suggest that galena (PbS) was available from only one source, a small area in northern Illinois near the present location of the town of Galena. Actually other sources exist and were probably of much greater importance for Hopewell trade. Galena is currently mined in large quantities from the tri-state area of northeastern Oklahoma, southwestern Missouri, and southeastern Kansas. The major deposits apparently are centered in the vicinity of Joplin, Missouri. Other sources are found in northern Arkansas, southeastern Missouri, and central Kentucky (Bastin *et al.* 1939). No prehistoric galena quarries or mines are currently known from any of these areas. The Copena sites of the central Tennessee River Valley have yielded by far the greatest quantities of galena in good archaeological context. In fact, the frequency here was sufficient to stimulate a number of prospectors and treasure hunters to search for the Indian "lead" mines in the area (Webb 1939, pp. 18-19). This search has continued to the present with more sophisticated technology, including satellite reconnaissance, with no success (J. Walthall, personal communication). Webb is emphatic in his insistence that the Tennessee Valley galena had to come from the Joplin, Missouri, deposits. He notes (Webb 1939, p. 19):

> The Tennessee Valley galena came from the Joplin, Mo., district. . . , the large masses of pure galena found in the aboriginal sites fit so perfectly the Joplin occurrence that there is no doubt about the accuracy of that designation as the original source of supply. Just what routes of travel the material took before reaching its final resting place is unknown . . . . The original source was unquestionably the Joplin district.

If Webb's position is correct, then in fact the vast majority of Hopewell galena was obtained from the Joplin area. Prufer (1964, p. 75) appears to hold to the position that this area was also the major source of the galena that reached the large Ohio sites.

The northern Cumberland plateau region produces a number of raw materials that were circulating through the Hopewell Interaction Sphere. Aside from Flint Ridge flint, probably the most significant of these is Ohio pipestone. Ohio pipestone, actually a soft argillaceous ironstone, outcrops on the summit of the highest hills on the east side of the Scioto River near its confluence with the Ohio in what is now Scioto County, Ohio. The pipestone stratum varies in thickness from approximately one foot to eleven feet, but averages about three to four feet. Mills (1922a, pp. 6, 89) notes that the aboriginal quarries are still visible along the crests of the higher hills in the area and are found directly across the river from the important Tremper Site. Ohio pipestone varies in mineral composition from outcrop to outcrop, and this is probably the reason for the wide range of colors exhibited. Typically, these range from cream to tan, yellow, green, gray, and red. With regard to the last, Mills (1922a, p. 89) notes that "this red variety is very hard to distinguish from the Minnesota pipestone, and many pipes and ornaments made of the Ohio material have been attributed to the Minnesota quarries." This fact will figure in a subsequent argument.

Ohio pipestone first attains importance as a raw material during Early Woodland, and it is particularly associated with the manufacture of diagnostic tubular pipes. During Middle Woodland trade in pipestone, whether as a raw material *per se* or as finished artifacts, increases dramatically to the extent that pipes of Ohio pipestone are found across a large portion of the mid-continent. With Late Woodland the trade in Ohio pipestone decreases markedly and is replaced to some extent by Appalachian steatite as well as locally available raw materials.

Pyrites (FeS_2) constitute another Interaction Sphere raw material available in the northern Cumberland plateau region. Prufer (1961a, p. 337) notes their availability in the immediate vicinity of Paint Creek on Copperas Mountain as well as farther north in the vicinity of present-day Cleveland. In addition to this source, Struever and Houart note their occurrence in Virginia, although no specific reference is given. Presumably this represents the deposit known to exist in Louisa and Prince William counties, Virginia (Palache *et al.* 1944, p. 286). Other potential pyrite sources include St. Laurence County, New York, northwestern Pennsylvania, Randolph County, Illinois, and eastern Tennessee (Palache *et al.* 1944, p. 286; Ashley 1912, pp. 69-71). In view of the very limited archaeological distribution, it seems safe to eliminate the Illinois, Tennessee, and Virginia sources from consideration.

Struever and Houart's distributional map suggests that the northern Cumberland plateau region is the only source of cannel coal. Although this material is available in the vicinity of Licking County, Ohio, as Struever and Houart suggest (Prufer 1961a, p. 669), it is certainly not the only source. Cannel coal or similar coals would have been available over much of the central Ohio Valley area, both in the gravels and as outcrops (H. Gray, personal communication). Cannel coal is an extremely tough, waxy bituminous coal composed primarily of spore exines. Because of its excellent quality as a fireplace fuel, many coal companies have falsely advertised their products as cannel coal when actually they are selling inferior grades. This may have caused some confusion in the archaeological literature. In any case, true cannel coal, in addition to occurring in the area reported by Struever and Houart, outcrops in West Virginia and near Cannelton, Indiana, in the Ohio drainage, and near Washington, Indiana, in the White River drainage. It should be re-emphasized that relatively large pieces would have been available in the Ohio gravels. This effectively makes the entire central Ohio drainage a potential source area, but it would be expected that efficient exploitation would be possible only near the outcrops.

The utilization of cannel coal is first evidenced on a large scale during the Late Archaic period, and cannel coal beads in particular are a fairly common artifact class on some sites in the central Ohio Valley. This exploitation continues through both the subsequent Woodland and Mississippian periods, becoming particularly intensive in the latter.

It is clear that the southern Appalachian Mountains also constituted a major resource zone where a variety of specific raw materials important in Interaction Sphere transactions were available. Mica was unquestionably the most significant of these. Mica is a relatively common mineral, but only in a relatively few locations does it form in large plates of the type traded through the Interaction Sphere. Of further help in delineating potential source areas is the fact that most Hopewell mica was not the smokey green to black biotite form [$K(Mg,Fe)_3(Al,Fe)Si_3O_{10}(OH,F)_2$], but rather, the almost colorless, transparent muscavite type [$KAl_3Si_3O_{10}(OH)_2$]. Sources of this type of mica would have been relatively scarce. Deposits are known to occur in Maine, New Hampshire, Virginia, North Carolina, South Dakota, Alabama, and northern Ontario (Sterrett 1923; Roberts *et al.* 1974). The mica deposits of western North Carolina are by far the most prolific and easily accessible, facts that are reflected archaeologically. Evidence of intensive aboriginal mica mining has been found in several portions of western North Carolina, notably in Mitchell, Yancey, and Macon counties (Holmes 1919, pp. 241-52; Sterrett 1923, p. 28), and possibly from Hall County, Georgia (Swanton 1946, p. 543). Approximately one hundred miles to the southwest, definite prehistoric quarrying has also been reported from the Appalachian region of eastern Alabama in what are now Randolph, Clay, Tallageda, and Jefferson counties (Swanton 1946, p. 543; Thomas 1891, p. 15). Many of these quarries were quite extensive. Near the late eighteenth-century Sink Hole mine, for example, it was noted that the Indians had excavated a number of large pits and trenches, some up to twenty feet in depth and covering about 1,800 square feet. Apparently most of this activity was limited to the upper decomposed parts of the pegmatite with little real hard-rock mining being done. Because of the archaeological evidence for extensive quarrying as well as the proximity of the deposits to regions participating in the Interaction Sphere, it is assumed that all Hopewell mica came from the southern Appalachian region.

Steatite or soapstone $[Mg_3(Si_4O_4)(OH)_2]$ was also an important raw material quarried in the southern Appalachian region. As used by Webb (1939, p. 17) and others, the term includes both serpentinic and talcose rocks which are sufficiently soft and massive to be used for the manufacture of artifacts. These talc deposits are located in the Appalachians from Vermont to Alabama, but it is in the southern portion of this area that one finds the best evidence for large-scale aboriginal quarrying. Webb (1939, p. 17) discusses several of the quarries located in the Tallapoosa uplands of eastcentral Alabama that produce a high-quality greenish steatite. To the east, A. R. Kelly excavated an aboriginal steatite quarry in what is now Fulton County, Georgia (M. White, personal communication). White (personal communication) also notes another site in Banks County, Georgia, with an outcrop of such high quality that the early settlers in the area used the material for tombstones. Farther to the north in what are now the North Carolina counties of Haywood and Jackson, White (personal communication) notes the existence of several large steatite workshop sites. Presumably the actual quarries were nearby. Luckenbach *et al.* (1975, p. 57) report a quarry near Green, North Carolina. These Southern Appalachian occurrences take on additional significance with the recognition that they lie within the territory of the Cherokee, a group known historically to have been the most sophisticated steatite craftsmen in the Southeast (Swanton 1946, p. 546).

Presently the greatest number of prehistoric steatite quarries are known to be in the Virginia piedmont area. This type of site has been recorded from what are now the counties of Cumberland, Goochland, Culpeper, Albemarle, Nelson, Madison, Amelia, Fairfax, and the District of Columbia (Fowke 1894, pp. 12, 36-37; Holmes 1919, pp. 230-48; Luckenbach *et al.* 1975, pp. 57-58). The amount of activity at the Clifton quarry in Fairfax County is particularly impressive; Holmes (1919, p. 231) notes that "the exposure of steatite had been followed into the hillside about 100 feet by the aboriginal miners, and the excavations in places reached a depth of nearly 20 feet in the solid stone, 10,000 or more cubic feet of which had been removed." The work of Holmes (1919, p. 230) suggests that most of the Virginia quarrying activity related to the production of steatite cooking vessels, hence to the Archaic rather than the Woodland period.

Hopewell steatite could have conceivably been obtained from quarries even farther to the northeast. Such sites are known from Maryland, Pennsylvania, Connecticut, Massachusetts, and Vermont (Holmes 1919, p. 238; Luckenbach *et al.* 1975, p. 57). Although not clearly demonstrable at this time, it would seem that these northeastern quarries as well as the Virginia sites were not the sources of the steatite circulating through the Interaction Sphere. The more logical sources are those in western North Carolina, northern Georgia, and eastern Alabama. In contrast to the northern quarries, the Southern Appalachian sources can be tied much more closely both geographically and culturally to the Interaction Sphere. Geographically, the northern quarries are located entirely across the Appalachians from any major centers of Hopewell activity and are associated with east-flowing streams. Culturally, although the eastern piedmont and coastal regions were certainly inhabited during Middle Woodland, participation in the Interaction Sphere appears to have been negligible (Stoltman 1974; Kinsey 1974). In contrast, the southern quarries were not quite so formidable in terms of access; they lay predominantly on streams flowing into the Gulf of Mexico (hence along major axes of communication with this area) and have demonstrable cultural ties to the Interaction Sphere via Connestee. Copena, and related complexes. Thus, following Shetrone and Greenman (1931, pp. 423-24), Morgan (1952, p. 92), and Prufer (1961a, p. 285), it is assumed that the vast majority of Hopewell steatite came from the Southeast.

Quartz (SiO_2) is another Interaction Sphere raw material that can be found in a variety of locations. Hopewell quartz most closely resembles the tightly structured, transparent form often referred to as rock crystal. The major deposits of rock crystal occur in the Catskill Mountains of eastern New York near the town of Ellenville and in the Ouachita Mountains in the vicinity of Hot Springs, Arkansas (Frondel 1962). The latter area is usually considered to have been one of the major sources of quartz for Hopewell groups as well as later populations (Struever and Houart 1972, p. 67; Ford and Willey 1940, p. 131; Bell 1946, p. 182). Quartz veins approaching the structure of the Arkansas and New York sources can be found throughout the Appalachians, however (Frondel 1962; Emmons and Laney 1926, p. 23). In such situations, quartz could have been quarried at the source, or, with considerably less effort, picked up as cobbles or boulders in local stream beds. At this point a more precise statement on the source or probable source of Hopewell quartz is not possible.

Graphite, a form of elemental carbon, is an Interaction Sphere raw material for which Streuver and Houart suggest three major source areas. Two of these are associated with the Appalachians while a third is located in the Black Prairie region of east Texas. On the basis of its extreme geographic isolation from the Hopewell mortuary sites where graphite has been recovered, this third area may reasonably be eliminated as a potential source of Hopewell graphite. Graphite is actually somewhat more common in the Appalachian area than Struever and Houart suggest. Major sources have been reported from Alabama, North Carolina, Rhode Island, New York, and eastern Ontario (Frondel 1962, p. 153; U.S. Bureau of Mines 1970). As with quartz, for a variety of reasons it would be overly ambitious at this time to specify the particular source(s) of Hopewell graphite. However, based on the fact that the northern sources are today mined primarily by deep shaft rather than open pit methods (U.S. Bureau of Mines 1970, p. 1029), and that graphite continued to be used by post-Hopewell cultures of the Southeast (e.g. Moore 1915, pp. 284, 331), the southern Appalachians probably constituted the major source area.

South of the Appalachians lies another major zone where a variety of Interaction Sphere raw materials were obtained. The Florida Gulf Coast provided a variety of marine materials of considerable economic value, including marine shell, shark teeth, alligator teeth, and barracuda jaws. The major source of marine shells probably lies farther to the east than either Struever and Houart (1972, p. 67) or Bell (1946, p. 182) suggests. Griffin *et al.* (1970, p. 97; 1946, p. 65) note the use of two genera in particular, *Busycon sp.* and *Cassis sp.,* and suggests that the latter could have only been procured on a regular basis off the coast of peninsular Florida and not along the Gulf Coast. In any case, marine shells can be considered as essentially a single source raw material when viewed from the perspective of the entire Interaction Sphere; they were only available within the Santa Rosa–Swift Creek area. Shark teeth, barracuda jaws, and alligator teeth were also most likely to have been procured in this area. Other possibilities exist, however, particularly with respect to shark and alligator teeth. Alligators, for example, are certainly not uncommon in the Mississippi Delta region within the Marksville area and apparently range as far north as the mouth of the Arkansas River (Williams 1967). They are also found along the Atlantic coastal plain as far north as the Carolinas (Shelford 1963, p. 85). The latter area will be excluded as a probable source area on the basis of the nonparticipation of the indigenous population in the Interaction Sphere. Shark teeth also present something of a problem. Obviously, sharks can be found in all coastal waters of the eastern United States, but again it is only in the Santa Rosa–Swift Creek area where there is evidence that the local population was involved in Hopewell exchange relationships. A further complication, however, is that apparently some of the shark teeth found in Hopewell contexts are fossil rather than modern forms, and it is not always an easy matter to separate the two (Prufer 1961a, p. 511). Fossilized teeth could have been found in a variety of places and would be particularly common in several Middle Atlantic states such as Maryland, but are also found farther to the south in Florida (Ritchie 1965, p. 249; Prufer 1961a, p. 511). A recent study by Murphy (1975, pp. 26-27) suggests that it would have been very unlikely that these fossil shark teeth came from deposits farther north than South Carolina.

Obsidian, Knife River chalcedony, catlinite, and grizzly bear canines have traditionally been regarded as western resources that lie outside the geographic boundaries of cultural groups participating directly in the Interaction Sphere. The implications are that Hopewell groups were therefore engaged in trade with groups inhabiting the high plains and Rocky Mountains or, more probably, that resource procurement parties were organized to obtain these materials. In the case of Knife River chalcedony and obsidian this would certainly appear to be the case; however, there is not enough evidence at this time to demonstrate that either catlinite or grizzly bear canines were Interaction Sphere commodities.

All of the Hopewell obsidian that has been subjected to physiochemical analysis has been shown to have been obtained from Obsidian Cliff in what is now Yellowstone National Park (Griffin, Gordus, and Wright 1969). Prior to Griffin's study, there had been considerable controversy relating to the source of this material. Obsidian, of course, has long been recognized as a common and extremely important raw material in prehistoric Mesoamerica, and its presence at Hopewell sites had long been used to support the theory that the Hopewell phenomenon developed as a result of direct contact with this area. As recently as 1959 it was argued that the Hopewell obsidian could not possibly have come from the Yellowstone area (Prufer 1961a, p. 284 quoting Ball 1959, p. 137). At this point the evidence strongly supports a Rocky Mountain origin.

Knife River chalcedony is found as outcrops and in stream deposits in the western part of what is now North Dakota (Clayton *et al.* 1970, pp. 282-90). It is a distinctive translucent brown color with occasional white opaque inclusions. It is also one of the best raw materials for the manufacture of chipped-stone tools in North America and was utilized and traded from Paleo-Indian times through the Plains Woodland period. Its location, close to the upper Missouri River which in turn must have served as a major route of travel to points farther west, particularly the Yellowstone area, also may have played some part in its importation by Hopewell groups.

Catlinite, an indurite clay, is available in the extreme southwestern portion of Minnesota and in northcentral Wisconsin, and aboriginal quarries exist in both areas (Murray 1968, pp. 23-24). It is a dull red color and was carved into a variety of objects, but pipes were the most important class of artifacts produced. There is considerable evidence for the manufacture and widespread trade of catlinite pipes from this area in the early historic and protohistoric periods, but evidence from earlier periods is not particularly conclusive. Based on the very strong similarity between catlinite and certain types of Ohio pipestone (see above, p. 295) and the infrequency with which catlinite artifacts have been reported in Hopewell contexts, it is quite probable that most or all of these occurrences in fact represent Ohio pipestone. Particular physical or chemical tests might provide a means of discriminating between the two, but for purposes of this study and based on the current evidence the few reports of catlinite will be considered to be Ohio pipestone.

The canines of the grizzly bear (*Ursus horribilus*) are often cited as another Interaction Sphere raw material that was obtained in the Far West. Prufer (1961a, p. 284), for example, notes that ". . . grizzly bear canines, so abundantly in evidence at Hopewell sites, also originated in the Rocky Mountain region." There is some reason to question this assumption. First, it is now clear that grizzly bears ranged much farther to the east in North America prior to European contact. They were indigenous, for example, to the river valleys of what would have been essentially prairie areas in Minnesota (Stoltman 1973, p. 111). Second and more important, it appears that no systematic studies have been done that will allow an archaeologist to separate easily grizzly canines from black bear canines. For example, Walter Dalquist (personal communication), a noted zoologist and paleontologist, suggests that

> . . . it certainly seems logical to think that both grizzly and black bear canines would be used in ornaments. However, I have had a great deal of difficulty in separating complete jaws and partial skulls from fossil deposits. A large male black bear may be almost as big, or even bigger than some races (*sic*), of female grizzlies. If the carnassial (the largest molariform tooth in the jaw) is present, identification is easier. I seriously doubt that isolated canines can be identified.

Somewhat more optimistically, John Craighead (personal communication), one of the leading authorities on bear ethology, writes:

> I'm afraid I don't have any references on morphological criteria for distinguishing black from grizzly bear canines. I am sure that large grizzly canines would be recognizable, but there would be an overlap between small grizzly and large black bear canines.

Thus, although there may well be grizzly bear canines circulating through the Interaction Sphere, the analytical work necessary to test this hypothesis has not been done. Consequently, the numerous "grizzly bear" canines described in previous studies of Hopewell will be assumed to be black bear canines. The context and distribution of the latter suggest that these should still be considered as Interaction Sphere raw materials, although, of course, they would have been available in all regions participating in the trade network.

Two other raw materials that are considered to have been extensively traded, but that would also have been locally available in most or all of the various regions, are meteoric iron and pearls. Struever and Houart (1972, p. 67) locate only one source of Hopewell meteoric iron on their map showing the distribution of source areas for Interaction Sphere raw materials. It lies near the Arkansas River in what is now southcentral Kansas. Although not explicitly stated, these authors are apparently basing their location of this source on a statement by Prufer (1961a, pp. 359-60) that an analysis of one of the specimens of meteoric iron recovered from Turner suggests it may have been part of the Brenham fall reported to have occurred near Kiowa, Kansas. At no point, however, does Prufer state this unequivocally. He does point out, however, that the meteoric iron from the Ohio Hopewell sites definitely represents several falls (Prufer 1961a, p. 360). These facts, taken together with the relatively widespread distribution of iron in Hopewell contexts suggest that meteoric iron must be considered to have been locally available in a number of areas. While the distribution of meteorites must be considered essentially a random one, ethnographic data summarized by Prufer (1961b, pp. 350-51) suggests that their location and identification probably was not. Because of topographic and vegetational features, prehistoric meteorite collectors would quite probably have been more successful in the open portions of the Midwest and Southwest than they would in the eastern forests.

Freshwater pearls were an extremely important commodity in the Hopewell exchange system. Obviously rare, they were especially prized for the manufacture of ornamental beads. Struever and Houart (1972, p. 74) have hypothesized that pearls collected in the lower Illinois Valley played a significant role in exchange relationships with Scioto Hopewell groups. In point of fact, this is a difficult hypothesis to test since freshwater pearls were available in every major stream in the central United States. There is some evidence, however, that does suggest that the major areas of concentration would have been within the Havana region.

During the early part of this century, a minor industry developed in the manufacture of mother-of-pearl buttons. At this time the collecting of the freshwater mussels used to produce these buttons involved a relatively sophisticated technology, including johnboats rigged with "mules" and "crowsfoot" lines. Data accumulated on this industry by the Department of Fisheries provide some insight into the availability of freshwater pearls. Of the several hundred species of mussels indigenous to the Midwest only a few deep-water species such as the elephant's ear, fat mucket, maple leaf, mucket, niggerhead, washboard, and pig toe were of sufficient size and quality to merit intensive utilization. Importantly, after the mussels were collected and boiled a search was made for pearls before the shells were shipped to the button factories (Ernster and Allen 1918, p. 23). The value of pearls found in each drainage was recorded and thus provides a reasonable estimate of aboriginal availability.

The upper Mississippi River was by far the most productive area for pearls in the early twentieth century. Fishermen were active between St. Paul, Minnesota, and Alton, Illinois. Below Alton exploitation declined markedly. A number of major mussel beds were found throughout this area, but the river in the vicinity of Muscatine, Iowa, and Prairie de Chien, Wisconsin, was apparently particularly productive. Both areas supported substantial Hopewell populations. In 1914 pearls worth $50,562 were reported from this section of the river. In contrast, the entire Ohio River drainage produced pearls worth $11,349, the Tennessee $10,149, and the Cumberland only $7,874. The figure from the northern Mississippi Valley is particularly impressive when it is realized that the industry had declined in the area by 58 per cent between 1903 and 1914 (Smith 1914, pp. 414-22; 1916, p. 586).

From the standpoint of the present study, this information on the recovery of pearls during the historic period is important for two reasons. First, it points out that all regions were potential sources for pearls. Second, it makes clear that relatively few streams produced large quantities of pearls, and that this apparently is reflective of their size and regimen. Rivers such as the Tennessee, Cumberland, Green, St. Francis, Holston, and Tombigbee, for example, were of minor consequence when compared to the productivity of the Mississippi, Illinois, and Ohio.

Twenty-three "exotic" materials given considerable importance by earlier researchers working with the Hopewell data have now been identified. A comparison of the results of the present study with those obtained in a recent analysis by Struever and Houart shows several major areas of disagreement. First, materials such as cannel coal, galena, iron, hematite, gypsum, and pyrites would have been available and no doubt were exploited in a number of areas that these authors do not consider. Conversely, it is argued that commodities such as graphite, mica, steatite, and alligator teeth were exploited in somewhat more limited contexts than Struever and Houart suggest. Attention has been given here to the relative availability of silver, black bear canines, and pearls, materials that must be considered as Interaction Sphere commodities, but which are not mentioned on Struever and Houart's distributional map of major Hopewell raw materials. Further, it has been suggested here that, based on the currently available evidence, the Hopewell utilization of catlinite was probably quite marginal and its presence in the earlier literature seems largely a result of confusing catlinite with red Ohio pipestone. It has also been pointed out that grizzly bear canines, although they may exist in Hopewell contexts, cannot be differentiated from black bear canines on the basis of the currently available information. Finally, it has been suggested that the concept of a "resource zone," a term designating an area where a variety of important raw materials were available, may be of some utility in delineating patterns of Hopewell trade.

The number of Hopewell sites that have produced particular Interaction Sphere raw materials together with the number of major regional traditions represented are listed in Table 10. It is suggested that this information can be used to gain some insight into the relative importance of each of these commodities within the Interaction Sphere. Obviously, "importance" is a variable considerably complex and with a variety of underlying independent associations. However, it is suggested that two of the most significant of these are the range and density of archaeological occurrence. The range of a material, as measured by the number of traditions represented, is seen as a measure of the breadth of cultural demand for a particular commodity; that is, within the Interaction Sphere materials of greater importance will be found to have been exchanged over a wider geographic area. Density, the second variable that will be used to measure the cultural importance of a particular material, is simply the number of occurrences of the commodity within the network of sites.

The results of a scattergram plot of the twenty-one available raw materials point out several interesting relationships (see Figure 4). First, the general shape of the relationship approximates a simple exponential curve indicating a significant, but nonlinear, relationship between density and range. Cases are distributed fairly homogeneously along this function with little obvious clustering. Three materials stand out as particularly important Interaction Sphere materials: copper, shell, and mica; each is found across all major regions and at a large number of sites. A fairly high percentage of raw materials exhibited a more limited range and/or density. This category of intermediate importance, representing the

TABLE 10. OCCURRENCE OF MAJOR INTERACTION SPHERE RAW MATERIALS AT HOPEWELL MORTUARY SITES AND WITHIN THE EIGHT MAJOR REGIONAL TRADITIONS

	Sites	Regions
1. copper	167	8
2. shell	114	8
3. mica	87	8
4. galena	63	8
5. bear canines	57	6
6. silver	32	7
7. steatite	21	7
8. Ohio pipestone	32	4
9. crystal quartz	26	6
10. iron	15	3
11. hematite	20	6
12. obsidian	20	2
13. shark teeth	14	5
14. cannel coal	7	3
15. graphite	7	5
16. pyrites	4	3
17. Knife River chalcedony	4	2
18. gypsum	3	3
19. alligator teeth	2	1
20. barracuda jaws	1	1
21. pearls	51	7

majority of materials, includes such commodities as galena, bear canines, pearls, silver, steatite, crystal quartz, iron, hematite, shark teeth, and Ohio pipestone. This pattern of distribution may reflect a variety of possible relations—for example, exorbitant cost, limitations based on differential status, or a smaller market. Such materials as graphite, obsidian, cannel coal, pyrites, Knife River chalcedony, gypsum, alligator teeth, and barracuda jaws appear so infrequently and over such a small area that they were probably of little importance in terms of economic exchange. It should be emphasized that this does not mean that these materials were not conceivably of considerable importance in other aspects of social life. They still, of course, must be considered as Interaction Sphere materials, and such commodities as obsidian and alligator teeth, found far from their nearest source area and obviously costly, were quite probably of considerable importance in reinforcing status or prestige. The point, however, is that this category of raw materials cannot be seen as particularly important to the operation and maintenance of the complex economic system that is currently connoted by the Interaction Sphere concept.

One further point that should be made here is that cultural importance has no apparent relationship with the availability of these raw materials. Certain goods such as obsidian, iron, silver, copper, and barracuda jaws would be rather difficult to obtain due to such factors as distance

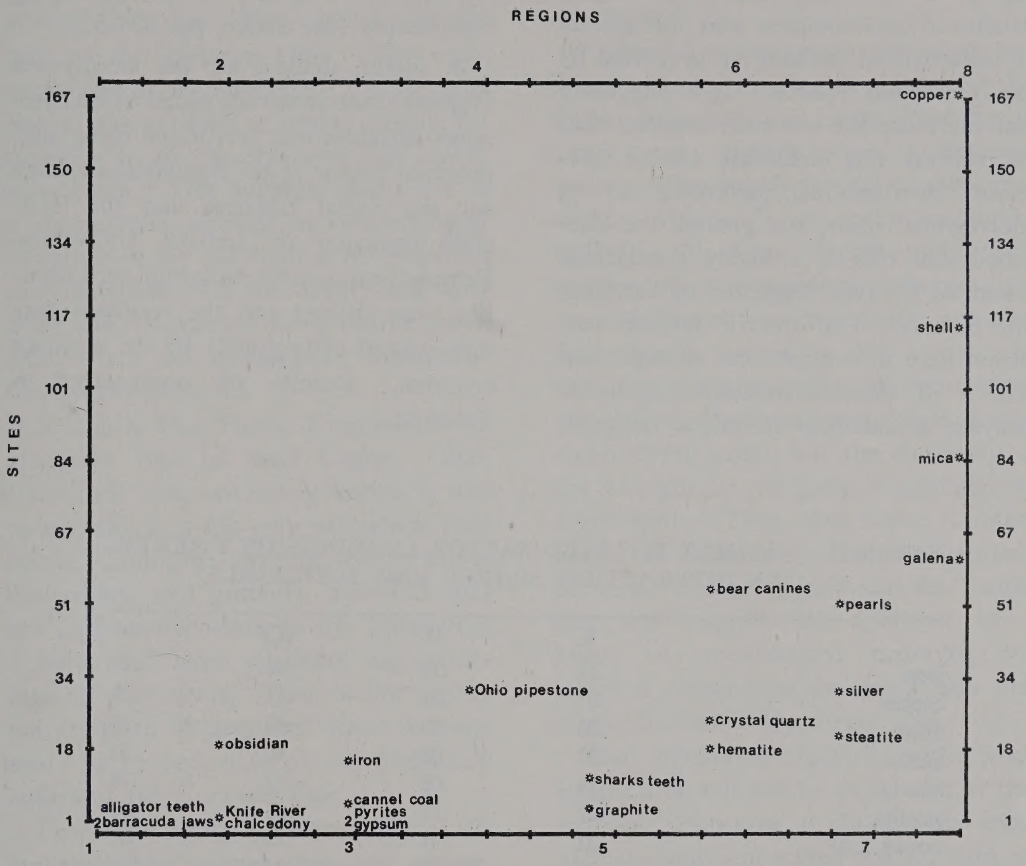

Figure 4. Scatter plot of Interaction Sphere raw materials at Hopewell mortuary sites and within regional traditions

to the source area, the cost of extraction, and size of the deposit. Other materials such as bear canines, pearls, gypsum, pyrites, and hematite would be fairly accessible in all regions. On the basis of the current data, it does not appear that the availability of particular resources figured significantly in the demand for these materials as reflected by their presence at particular Hopewell mortuary sites. This might suggest that the demands of the ideological system associated with the procurement of these materials were structured on principles other than simply minimizing costs; not all "exotic" raw materials had equivalent utility.

At this point, having amassed a considerable amount of information on the distribution, availability, and cultural importance of a variety of Hopewell raw materials, it is necessary to interpret this information as it relates to the Interaction Sphere concept. The central question is, assuming trade took place primarily in raw materials, how highly structured and complex was the system of interregional exchange represented by the Interaction Sphere? It is suggested that the more the evidence suggests that the various raw materials exhibit correlated distributional patterning on an interregional basis, the greater the likelihood that this is a highly regularized system of the type suggested by Struever and Houart. The specific method employed here to evaluate the strength and pattern of these correlations is factor analysis, a statistical technique designed to reduce the variation exhibited among variables to a smaller set of underlying components (see above, pp. 254-55).

A factor analysis of the twenty-one Hopewell raw materials coded as dichotomous variables was performed using subprogram Factor of the Statistical Package for the Social Sciences and the CDC 6600 computer of Indiana University. Principal-component factoring with iteration was utilized and the resultant factors rotated orthogonally by the varimax criterion. Results are summarized in Table 11.

TABLE 11. VARIMAX ROTATED FACTOR LOADINGS OF TWENTY-ONE INTERACTION SPHERE RAW MATERIALS

	I	II	III	h^2
iron	.17	.10	.46	.47
copper	.01	.32	.11	.31
mica	.05	.29	.26	.24
galena	.07	.03	.10	.52
quartz	.14	.08	.43	.26
steatite	.07	.12	.55	.33
cannel coal	.31	.21	.12	.36
Ohio pipestone	.08	.32	.02	.21
shell	.03	.50	.24	.36
obsidian	.08	.15	.15	.44
Knife River chalcedony	.43	.06	.01	.47
bear canines	.10	.51	.09	.35
pyrites	.50	.06	.01	.30
graphite	.31	.06	.20	.16
barracuda jaws	.94	.01	.17	.96
shark teeth	.10	.06	.70	.64
alligator teeth	.13	.08	.20	.49
gypsum	.57	.07	.13	.36
hematite	.15	.11	.27	.16
silver	.11	.21	.17	.60
pearls	.08	.79	.05	.67
R^2	45.7%	17.6%	11.7%	

After seven rotations this analysis produced only three factors with eigenvalues greater than one. They explain 75 per cent of the variance (R^2). The communalities of the materials (h^2), the portion of the variance of every variable reproduced by the factors, were very low in most cases. This suggests that there is a considerable amount of noncorrelated variation in the distribution of Hopewell raw materials. Of the twenty-one variables, only barracuda jaws, pearls, shark teeth, silver, and galena have communalities greater than .50.

It is clear that Factor I represents the Hopewell Site in Ross County, Ohio. Barracuda jaws are highly loaded in this factor, and it is the only site where they occur. Similarly, gypsum, Knife River chalcedony, and graphite, materials that are quite unimportant in the Interaction Sphere, also have relatively high loadings on this factor. Thus Factor I does not relate to interregional trade, but appears to be indicative of the distinctive nature of the Hopewell Site.

Pearls are highly loaded on Factor II, and shell, bear canines, pipestone, copper, and mica are relatively highly loaded on this factor. All of these commodities are relatively important in interregional transactions and are obtained from resource bases located in a variety of different areas. Archaeologically, pipestone, bear canines, and pearls are predominantly limited to sites in the northern traditions, particularly the Havana, Crab Orchard, and Scioto areas. This factor would seem to relate to interregional trade in the north. It provides some support that these materials were involved in the sort of reciprocal trading between regions that Struever and Houart have suggested, although the particular examples they provide are not loaded on this factor.

Factor III is somewhat ambiguous, but may indicate interaction between the Scioto area and the Santa Rosa–Swift Creek area. Shark teeth, a material found predominantly in sites of these traditions (10/14=71 per cent), are highly loaded on this factor. Steatite and crystal quartz, two other southern resources, but from different resource zones, are also fairly highly loaded on this factor. In both cases the majority of occurrences are also in the Scioto and Santa Rosa–Swift Creek areas, but the clustering is not as tight as the pattern exhibited by shark teeth. Thus, this factor is interpreted as indicating a trade relationship between Scioto Hopewell and the Southeast and suggests the existence of a group of southeastern materials for which a demand in the north was primarily limited to the Scioto area.

The remaining factors with small eigenvalues will not be dealt with in this analysis. However, it appears that most of these represent either specific sites, as with Factor I, or groups of sites within particular regions. They do not in general seem to relate closely to the problem of interregional trade.

The results of a principal-component factor analysis were not particularly supportive of the position that there was a great volume of highly structured, regularized trade in raw materials between major cultural regions. Variables in general exhibited low communalities indicating a considerable amount of noncorrelated variation in the distribution of Hopewell raw materials. Only three factors with eigenvalues greater than one were produced after seven rotations. Of these, two seem to relate to interregional trade. One appears to be a general northern Hopewell interregional trading factor and would support the type of reciprocal trading between regions that Struever and Houart suggest, although the specific raw materials are different. A second, somewhat more difficult to interpret, factor also appears to relate to interregional trade and suggests that a few southern resources were procured by Ohio Hopewell groups in some nonreciprocal fashion. One possibility is that this was traded for northern copper, but that since the market for copper was so expansive, it does not closely correlate with the distribution of these materials. Another is that these commodities were procured by forays into the Southeast by Ohio groups with little formal trading taking place.

The major "exotic" raw materials circulated through the Interaction Sphere have now been examined. The distribution, availability, and cultural importance of each of these has been discussed, and a factor analysis performed to determine if particular patterns exist that suggest interregional trade in raw materials. Results do not suggest a high degree of interregional organization. It should be noted, however, that this view of Hopewell trade is in a sense overly simplistic; it does not take into consideration the possibility that many of these materials were traded not as raw materials but as finished goods. The regularized exchange of finished products indicates a somewhat more complex system than one in which primarily raw materials are exchanged, and Struever and Houart and other researchers have suggested that the trading of finished goods was in fact an important part of interregional interaction. Consequently attention is now given to testing a somewhat more complex model of Hopewell interregional trade, incorporating information on the distribution of particular Hopewell artifact classes.

V

THE INTERACTION SPHERE ARTIFACTS

It is possible to visualize interregional interaction taking place on a number of levels. In focusing on trade in the strict sense, however, interaction can only take place in raw materials or in finished products. The cultural implications of these two are somewhat different. If trade is limited to raw materials, it suggests that there are particular qualities inherent in the materials that stimulate exchange. These may be of a strictly physical nature, for example, the malleability of metal, or a social or ideological reason such as the "exotic" nature of obsidian. In many cases, choices were no doubt influenced by a combination of several such variables. This type of exchange not only places the cost (and skill) of manufacture with the purchaser, but also allows him the flexibility to decide how the material will ultimately be used. In contrast, if trade is operating primarily in finished goods, it can be assumed that there is a demand for both the material as well as the finished item produced from it. The latter situation would presumably indicate a greater degree of interregional overlap or sharing of social and ideological values.

Although they note the possibility that interregional Hopewell trade might have been primarily in raw materials, Struever and Houart emphasize the importance of interregional trade in finished artifacts as a part of their Interaction Sphere model. They argue that a wide range of finished products were circulating between regions, and on the basis of concentrations of artifacts and debris, identify major manufacturing centers for specific artifact types. For example, they suggest that platform pipes, bicymbal earspools, copper axes, and trimmed mica sheets were shipped from the Ohio centers to Illinois Valley cultural groups in exchange for such commodities as Hopewell figurines, Hopewell ware, and pulley-type earspools (Struever and Houart 1972, p. 74). As noted earlier, many of their conclusions merit further evaluation, and at this point several questions that relate to the nature of Hopewell trade in finished artifacts will be addressed. As an initial step, it is, of course, necessary to identify those artifacts that were potential items of interregional trade. This certainly is not an easy task, given the nature of the data, and requires that certain assumptions be made. It is hoped that these will serve to maximize the power of the analysis and minimize the distortion of archaeological reality. With this in mind and for purposes of this particular study, it was felt that it would be best to define potential trade goods as broadly as possible. This provides maximum contrast with a model based entirely on raw material trade and also would appear to be compatible with the thinking of Struever and Houart.

In order to identify those artifacts that may have been involved in interregional trade, it was decided that emphasis should be placed on those examples that both belong to an artifact type having an interregional distribution and that are made of Interaction Sphere raw materials. More specifically, artifact types and Interaction Sphere raw materials can be viewed as only partially overlapping sets, and it is felt that by limiting the study to the area of articulation that the probability of dealing with potential Interaction Sphere goods will be high. It is recognized that there are no doubt exceptions to this generalization; that is, there are artifacts made of Interaction Sphere raw materials that represent local manufacture rather than trade, and there are some artifacts that are Interaction Sphere goods, but are not made of Interaction Sphere raw materials. In order to deal with these situations successfully, the stylistic variation represented within a particular type must be carefully studied. If a subset of artifacts of a given type can be shown to exhibit regionally specific variation, it will be excluded from this portion of the analysis regardless of raw material, since it is assumed that these artifacts represent local products. Conversely, if an artifact made of non-Interaction Sphere materials falls within the range of stylistic variation of members of that type made of Interaction Sphere materials, and if the type is of sufficient complexity so that some diversity is recognizable, the artifact in question will be included in the analysis.

Thirty-nine types have been defined which either have a high percentage of specimens made of Interaction Sphere raw materials or that have been considered as Interaction Sphere artifacts by previous investigators. This typology is oriented toward description rather than function, although it should be noted that almost without exception the artifacts included in these types do not directly relate to subsistence technology. Further, it is recognized that these types do not necessarily reflect the taxonomy of the makers. They are meant, however, to be mutually exclusive and sufficiently distinct to allow both the easy discrimination among types and the assignment of new cases to the existing system. It is hypothesized that analysis will allow some of these types to be eliminated from consideration as Interaction Sphere types.

Once an interregional artifact type has been defined, it then becomes important to examine the distribution of occurrences in order to determine if a major manufacturing center or centers can be delineated. Even if this can only be limited to a particular region rather than to a specific site, it becomes important information in interpreting the meaning of interregional exchange patterns. The basic assumption employed here is the same used by many of the early diffusionists—that finished goods will tend to be found in greater concentrations closer to the source of their manufacture. This simply suggests that given a demand for a particular artifact type and given the fact that the costs involved are a function of the energy required for extraction, transport, and manufacture, trade goods will be found in greater densities near the source of their manufacture. Although this argument does not necessarily hold true in the contemporary industrial market, it does in general appear basically sound in many prehistoric situations (e.g. Fogel 1963; Didier 1967; Renfrew *et al.* 1968, p. 328; Pires-Ferreira 1975, p. 4). It should also be noted here that the interpretation of distributional patterns will rely most heavily on a qualitative approach emphasizing the presence or absence of a particular artifact type. However, this will be supplemented with quantitative information in those cases where reasonably complete samples are available.

In addition to defining manufacturing centers, the relative importance as well as the covariation of trade goods will be examined in order to delineate further the nature of Hopewell trade. The methodology will be essentially the same as that employed in the preceding chapter.

One additional point should be made before proceeding with this analysis. There has been in the past a tendency to view such Interaction Sphere artifacts as panpipes, copper celts, metal cutouts, and nonutilitarian pottery wares as costly, esoteric items whose incorporation into burial contexts bespeaks wealth, power, and surplus energy. This is no doubt true, but the point that needs to be made is that in almost all cases, the excessive cost of these artifacts lies much more in the realm of extraction and transport of raw materials than it does in the actual production of the artifacts. Although the available experimental evidence is rather scarce, it is safe to assume that it takes much more time and energy to build a circular house, to carve a dugout canoe, or even to kill and butcher a deer than it does to make the vast majority of Interaction Sphere artifacts. For example, it apparently takes less than half an hour to make a large, carefully flaked spear point, a shell bead, or an elaborate copper cutout (Martin *et al.* 1947; Haury 1931, pp. 82, 86-87; Cushing 1894, p. 103). Relatively sophisticated ground stone items can be made in less than four hours (Martin *et al.* 1947, p. 32). The production of carefully constructed and well-fired ceramics takes only between three and eight hours of work per vessel (Martin *et al.* 1947, p. 59). Only a few Hopewell artifact types such as pipes and possibly stone earspools required more than a few hours of production time.

EVALUATION OF THE DATA

1. Bicymbal earspools

On the basis of the available data, and following Ford (1969, p. 72), Martin *et al.* (1947, p. 278), and Griffin (1946, p. 65), all known bicymbal earspools are considered in this study as potential interregional trade goods. These artifacts have been found at 58 of the 242 sites in the sample* and are found in all eight of the major ceramic areas defined in this study. Although a variety of manufacturing techniques has been documented for these artifacts, none appears to be regional isolates in areas other than Ohio, the area that has definitely produced the greatest variety of forms (see Cotter and Corbett 1951, pp. 37-39; Quimby 1944, p. 421; Prufer 1961a, pp. 381-83). Further, no particular combination of the raw materials used to make earspools—iron, silver, and copper—can be found in any region that cannot be duplicated in the Ohio area.

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* The sample includes 242 sites (see Table 18, below). Only 241 sites are listed on Tables 2-9 because the Watkins site (Table 18, no. 204) did not fit into any of the defined categories. The site is located in southcentral Kentucky. It has produced ceramics which are limestone-tempered, zoned incised, and tetrapodal. These do not appear to be Crab Orchard or Copena, and no Middle Woodland sites could be documented in the vicinity.

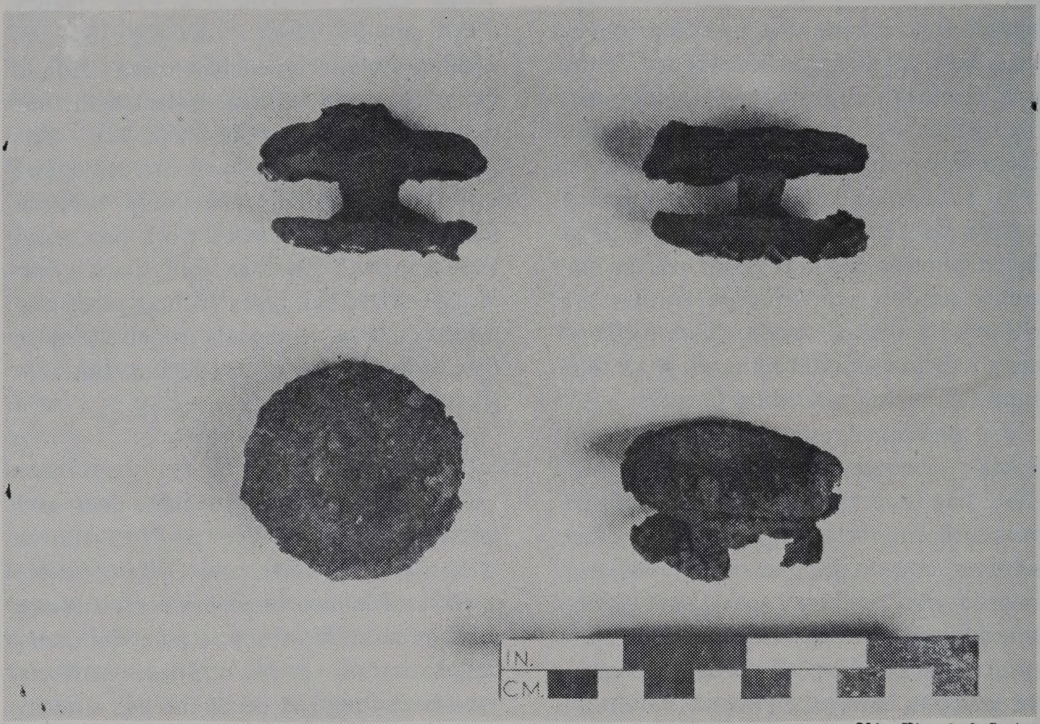

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PLATE I. Bicymbal earspools

The distributional information is consistent with the stylistic and raw material data and suggests that Ohio was the major manufacturing area for the bicymbal earspools traded through the Interaction Sphere. Over one half of the Ohio Hopewell sites have produced earspools, a figure considerably larger than those obtained from most other areas (see Table 12). This takes on additional significance with the recognition that not only have a greater percentage of Ohio sites produced these artifacts, but they have also produced a much greater number of individual specimens. Mortuary sites in the Scioto area have produced at least 460 earspools of this type, and the actual number can be assumed to have certainly exceeded 500 specimens, especially when the nature of some of the early excavations and the Hopewell practice of ceremonially "killing" artifacts, often beyond recognition, are taken into consideration. The actual count obtained from this study was 474, a figure several orders of magnitude greater than that obtained from any other region. The Havana and Southern Appalachian areas, which produced the second and third largest totals, have yielded, for example, only thirty-six and thirty-five earspools respectively. Viewed somewhat differently, this represents the difference between about 40.6 pounds of worked copper and 3.1 or 3.0 pounds, figures derived from the assumption that earspools on the aver-

TABLE 12. FREQUENCY OF SITES PER REGION YIELDING ARTIFACT CLASSES OF INTERREGIONAL DISTRIBUTION

	Scioto	Point Peninsula	Santa Rosa-Swift Creek	Southern Appalachian	Miller-Porter	Marksville	Crab Orchard	Havana
1. Bicymbal earspools	19/38=50%	1/21= 5%	3/20=15%	13/31=42%	2/8=25%	3/17=18%	4/8=50%	13/98=13%
2. Breastplates	15/38=39%	———	———	3/31=10%	———	———	———	4/98= 4%
3. Cutouts	7/38=18%	3/21=14%	———	2/31= 6%	———	———	———	3/98= 3%
4. Buttons	7/38=18%	1/21= 5%	———	———	———	———	———	2/98= 2%
5. Headplates	7/38=18%	———	———	———	———	———	1/8=13%	1/98= 1%
6. Tinklers	2/38= 5%	———	———	———	———	———	———	3/98= 3%
7. Crescent gorgets	7/38=18%	1/21= 5%	2/20=10%	1/31= 3%	———	———	———	3/98= 3%
8. Ross Barbed points	4/38=11%	———	———	———	———	———	———	3/98= 3%
9. Panpipes	9/38=24%	2/21=10%	5/20=25%	2/31= 6%	3/8=38%	2/17=21%	1/8=13%	9/98= 9%
10. Platform pipes	9/38=24%	4/21=19%	1/20= 5%	———	———	———	3/8=38%	21/98=21%
11. Mirrors	21/38=55%	9/21=43%	13/20=65%	4/31=13%	3/8=38%	1/17= 6%	3/8=38%	31/98=32%
12. Pulley earspools	5/38=13%	———	———	———	———	———	1/8=13%	7/98= 7%
13. Circular pendants	2/38= 5%	———	2/20=10%	4/31=13%	———	———	———	———
14. Reel-shaped gorgets	4/38=11%	———	———	14/31=45%	1/8=13%	1/17= 6%	———	———
15. Elbow pipes	1/38= 3%	———	3/20=15%	10/31=32%	———	———	———	———
16. Copena pipes	1/38= 3%	———	———	1/31= 3%	———	———	1/8=13%	———
17. Plummets	4/38=11%	———	7/20=35%	———	———	———	———	———
18. Conch shell dippers	13/38=34%	1/21= 5%	13/20=65%	13/31=42%	1/8=13%	2/17=12%	4/8=50%	37/98=38%
19. Nonutilitarian celts	13/38=34%	4/21=19%	———	11/31=35%	———	———	6/8=75%	35/98=39%
20. Shell beads	14/38=37%	6/21=29%	6/20=30%	11/31=35%	———	2/17=12%	4/8=50%	30/98=31%
21. Pearl beads	14/38=37%	2/21=10%	1/20=20%	———	1/8=13%	2/17=12%	5/8=63%	26/98=27%
22. Cold-hammered beads	10/38=26%	8/21=38%	2/20=10%	20/31=65%	2/8=25%	3/17=18%	3/8=38%	28/98=29%
23. Cold-hammered awls	7/38=18%	4/21=19%	1/20= 5%	1/31= 3%	———	———	2/8=25%	19/98=19%
24. Unicymbal ear discs	2/38= 5%	1/21= 5%	6/20=30%	2/31= 6%	3/8=38%	2/17=12%	3/8=38%	4/98= 4%
25. Finger rings	1/38= 3%	———	———	———	———	———	———	1/98= 1%
26. Bracelets	7/38=18%	———	———	4/31=13%	———	2/17=12%	———	———
27. Bear Canine ornaments	15/38=39%	1/21= 5%	1/20= 5%	2/31= 6%	———	———	4/8=50%	34/98=35%

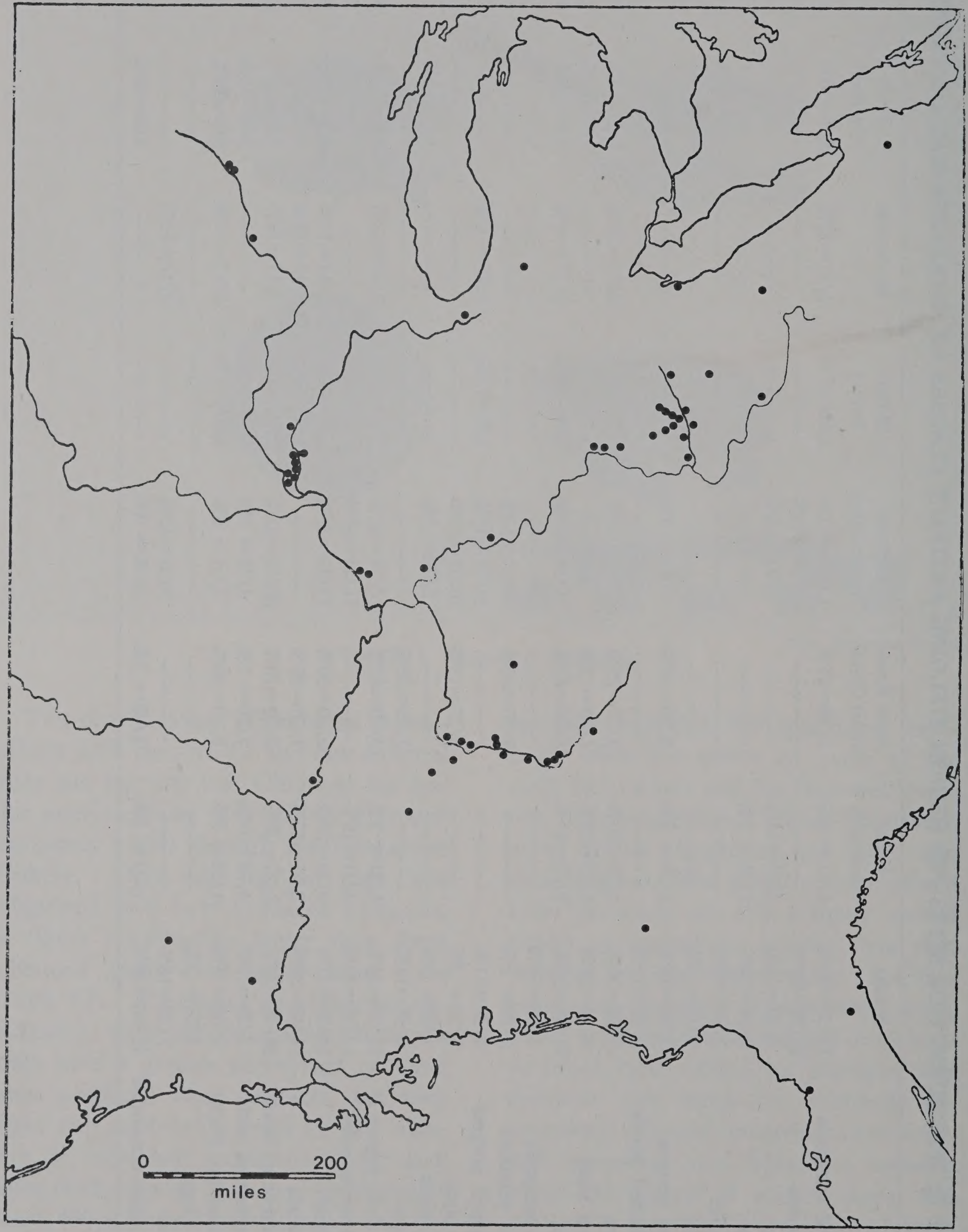

Figure 5. Distribution of bicymbal earspools at Hopewell mortuary sites

age weigh about .09 pounds (mean of fourteen complete specimens from Hopewell, Mound City, and Harness equals 38.9 grams with a range from 51 to 27 and a standard deviation of 6.8). Thus, the data suggest that although the vast majority were utilized locally, bicymbal earspools were traded to a variety of areas, with the strongest ties extending to the southeast (Copena and Santa Rosa-Swift Creek) and west (lower Havana or lower Illinois Valley). The spatial distribution of bicymbal earspools is shown in Figure 5.

Without secondary stages of manufacture or debris specific to earspool manufacture, it is difficult to pinpoint a particular site or sites within the Scioto region as manufacturing centers. Turner and Hopewell, however, stand out as having produced more earspools than any of the other Ohio sites. Each has yielded over one hundred.

2. Breastplates

Cold-hammered metal breastplates have been found at twenty-seven Hopewell sites. Except for one meteoric iron example recovered from Circleville, all are made of copper. The vast majority of these artifacts must be considered as potential trade items and were quite probably made in Ohio. Several, however, can be definitely excluded from further consideration. Stylistically, breastplates are generally large, rectanguloid in outline, devoid of surface decoration, and exhibit two centrally located perforations. Often the lateral edges are somewhat more concave than the superior and inferior borders. Breastplates conforming to this general shape have been found at all of the major sites in Ohio such as Turner, Hopewell, Seip, Mound City, and Harness. They are often wrapped in fabric, a characteristic they share with many

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PLATE II. Breastplate

of the nonutilitarian celts found in Hopewell mortuary contexts. In addition to the sites listed above, similar breastplates have been recovered from other Ohio sites such as Bourneville, Twin Mounds, Ater, Porter, Fort Ancient, Circleville, Boyle, and Rockhold, and at sites outside the immediate area at Tunacunnhee, Shaw, Wright, Weaver, Courtois, and Schwert (see Figure 6). In contrast, breastplates from Sioux, Coulee, White, and Effigy all exhibit multiple rows of bosses at the lateral margins, a characteristic that is apparently regionally specific and would support the position that they are local products. Similarly, the raised design on the Crystal River breastplate and the circular shape of the breastplate from Merrigan suggest that these specimens also were locally produced from Interaction Sphere raw materials.

A few effigy breastplates are known. Several of these were excavated at Mound City, Edward Rutledge, and Bedford. The Bedford (Pike County, Illinois) specimen, which appears to have "weeping eye" falcons as the dominant motif, is the only one of these found outside Ohio. It does, however, bear a strong resemblance to the Rutledge specimen in general style and is symbolically similar to the several falcon effigy breastplates from Mound City. It, too, was probably made in Ohio.

The commercial impact of breastplates as interregional trade goods must have been minimal. They have only been found in three of the eight regions. Further, of the sites included in the sample, only seven representing a grand total of ten individual breastplates are located outside Ohio. This contrasts markedly with the concentration of 15 sites within the Scioto region that have produced at least 180 individual specimens. If the assumption is made that on the average these plates weigh about one-half pound (mean of eleven specimens from Hopewell equals 222 grams with a range from 427 to 45 and a standard deviation of 115.6), then the amount of worked copper consumed as breastplates in Ohio would be approximately eighty-eight pounds in contrast to the three and one and one-half pounds traded to the Copena and Havana areas, respectively.

It is not unreasonable to assume from the distributional pattern that the major center or centers of breastplate production were located near the Scioto-Paint Creek confluence. Both Seip and Hopewell produced over sixty specimens.

3. Cutouts

Cutout geometric and zoomorphic designs of mica and copper occur at fifteen sites. They are definitely interregional artifacts, and are quite probably Ohio products. They are found in a much higher percentage of sites here than they are in any of the other regions (Table 12). Further, several hundred of these artifacts, which apparently served a decorative and/or symbolic function on ceremonial garments, have been found at sites such as Hopewell, Turner, and Seip. This stands in marked contrast to the isolated occurrence of one or two cutouts in mounds located in other regions. Struever and Houart (1972, p. 71) have argued that the manufacture of cutouts was centered at the Hopewell Site. The evidence does not allow this degree of specificity, especially when Turner and Seip have produced considerably greater quantities (see Shetrone and Greenman

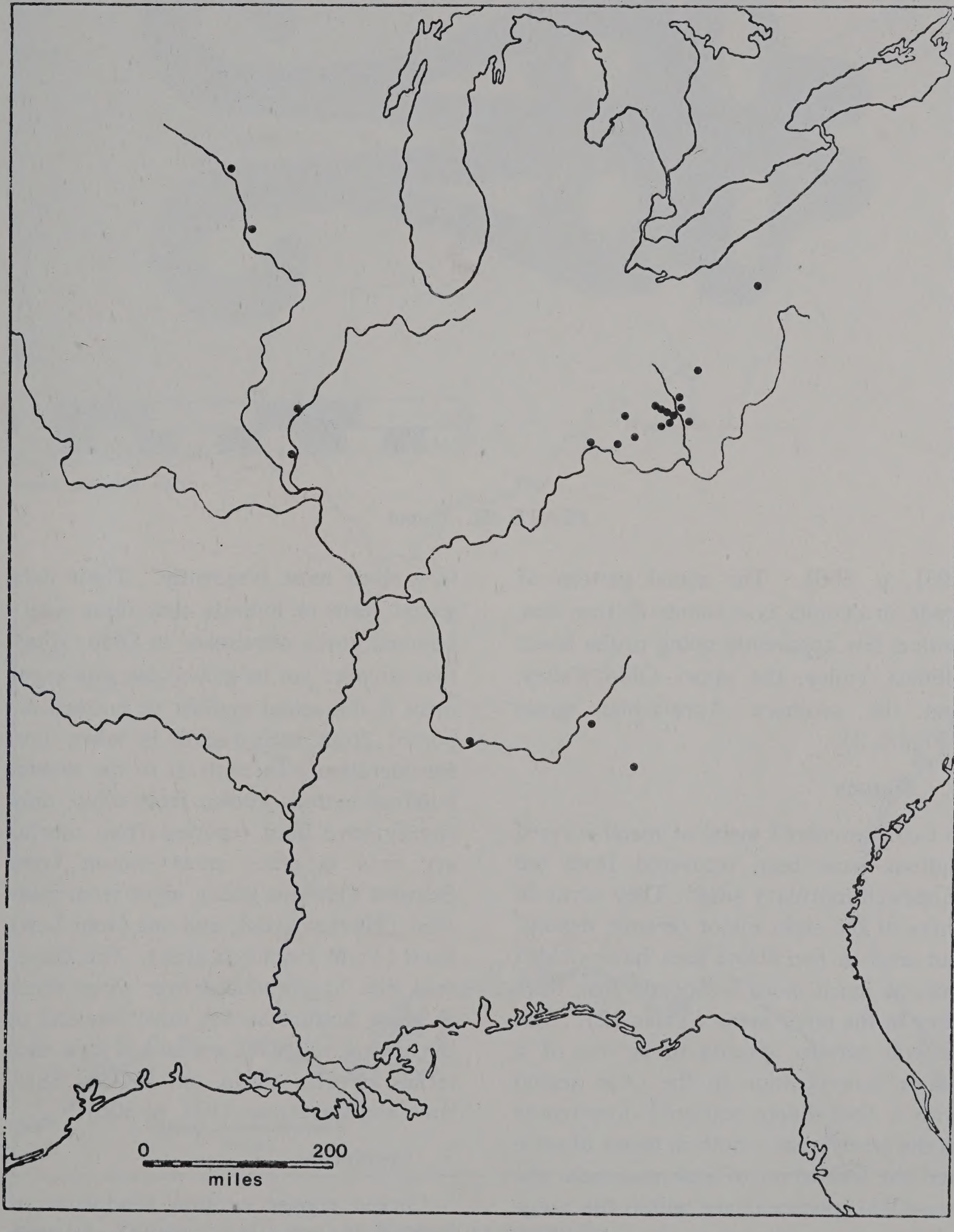

Figure 6. Distribution of breastplates at Hopewell mortuary sites

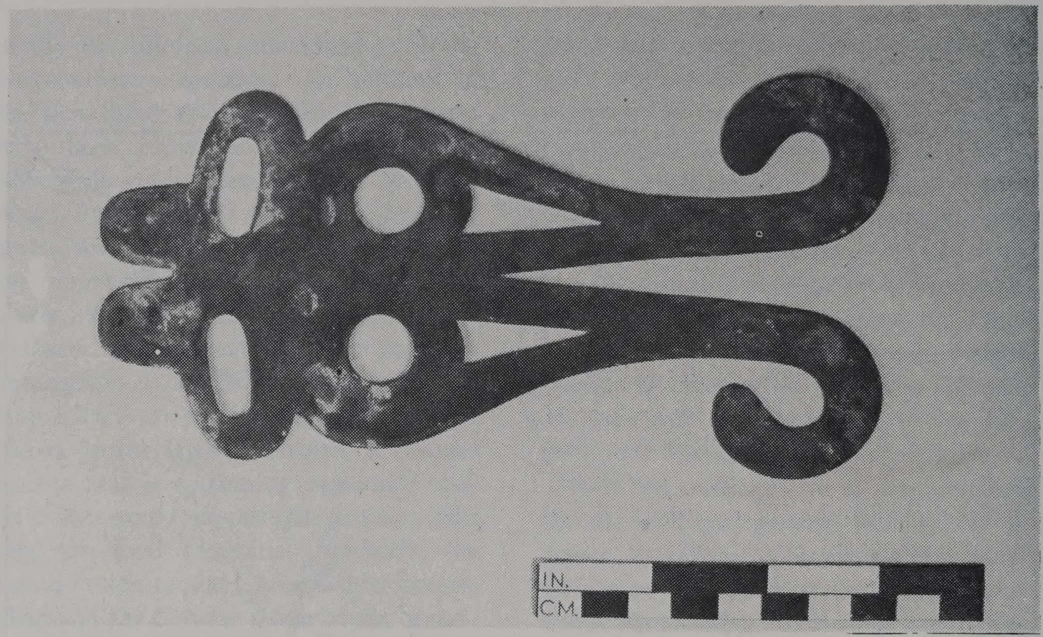

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PLATE III. Cutout

1931, p. 506). The actual pattern of trade in cutouts is a rather diffuse one, with a few apparently going to the lower Illinois Valley, the upper Ohio Valley, and the southern Appalachian areas (Figure 7).

4. Buttons

Cold-hammered metal or metal-covered buttons have been recovered from ten Hopewell mortuary sites. They occur in three of the eight major ceramic regions, but sites in the Scioto area have yielded buttons much more frequently than have sites in the other areas (Table 12). The general pattern appears to be one of a major concentration in the Ohio region with a few widely scattered occurrences in the other areas. Both in terms of style and the utilization of raw materials, the non-Ohio specimens are within the range of variation evidenced in the area where they occur most frequently. These data would seem to indicate that these inter-regional goods were made in Ohio. Further support can be gained for this argument if the actual number of buttons reported from each region is taken into consideration. In contrast to the several hundred buttons known from Ohio, only twenty have been reported from mortuary sites in other areas—eleven from Schwert (Havana area), eight from Bedford (Havana area), and one from Lewiston (Point Peninsula area). The Hopewell Site has produced over three times as many buttons as any other site and in the widest range of styles and raw materials (Prufer 1961a, pp. 384-85; Shetrone and Greenman 1931, p. 506).

5. Headplates

Curved copper or iron headplates of both plain and effigy form have been

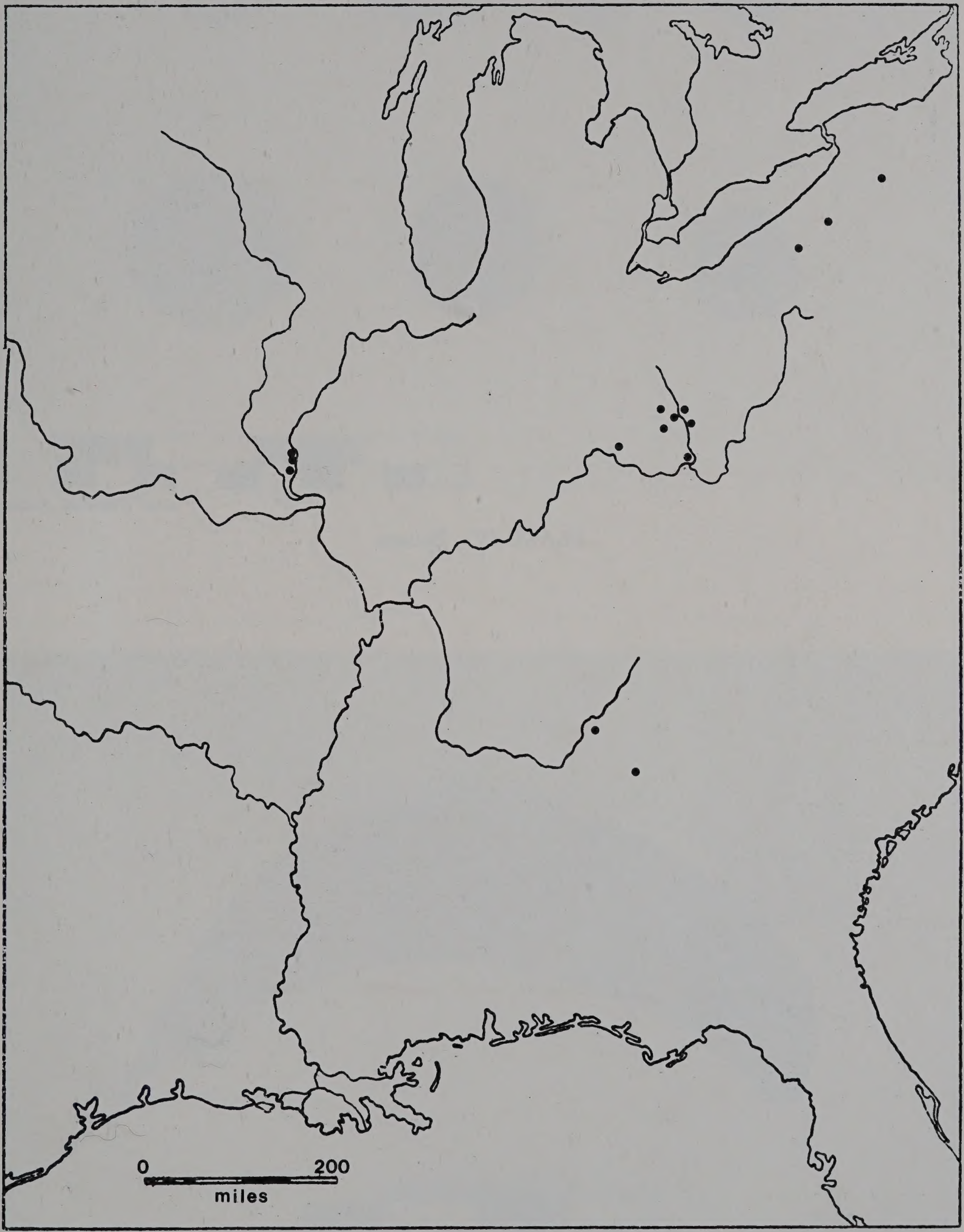

Figure 7. Distribution of cutouts at Hopewell mortuary sites

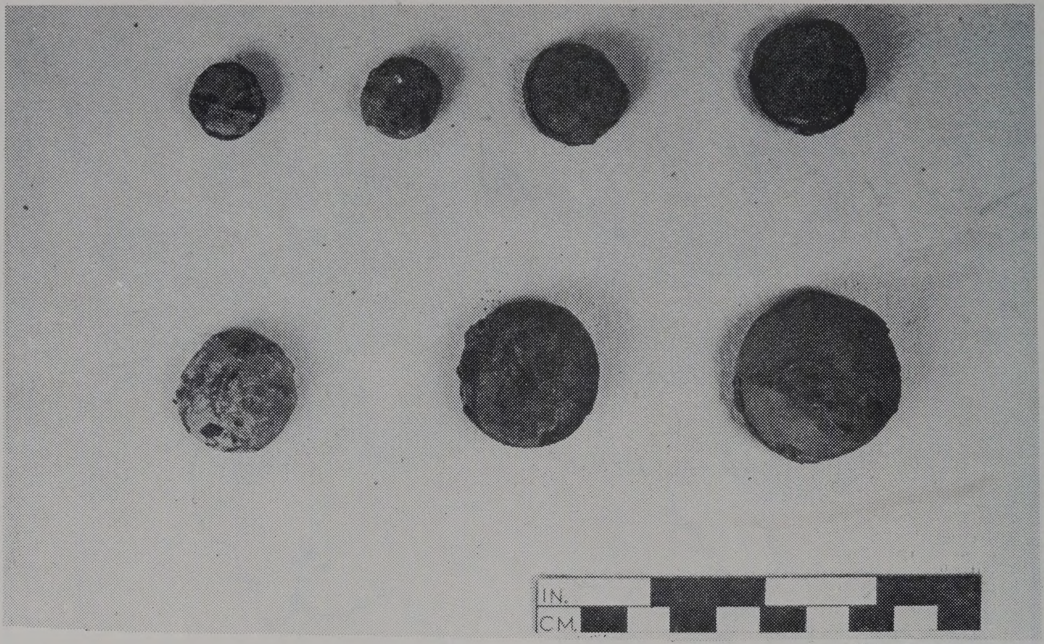

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PLATE IV. Buttons

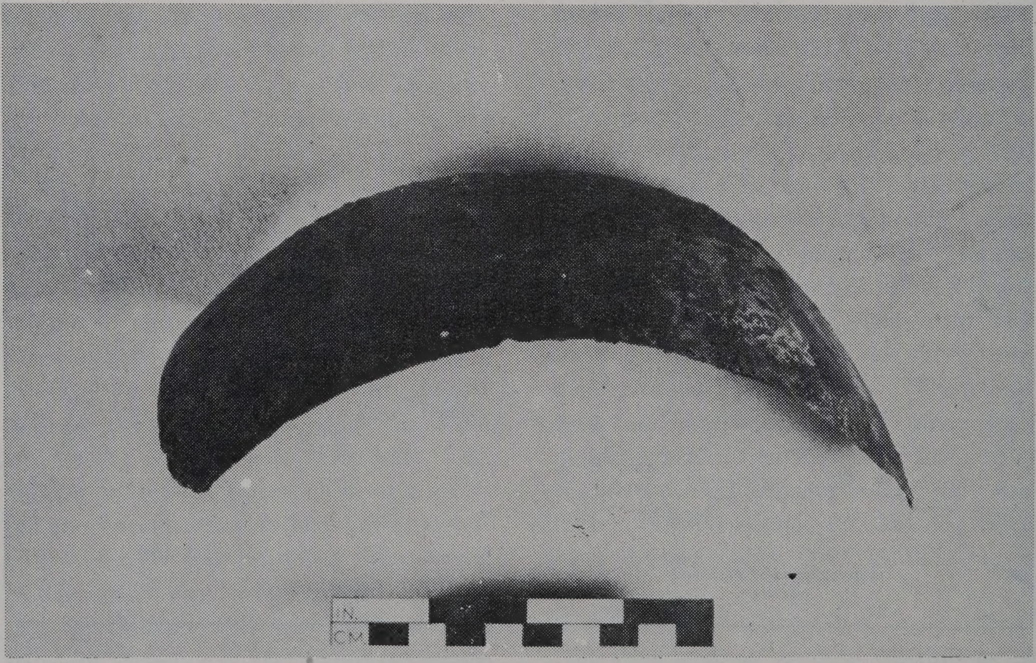

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PLATE V. Headplate

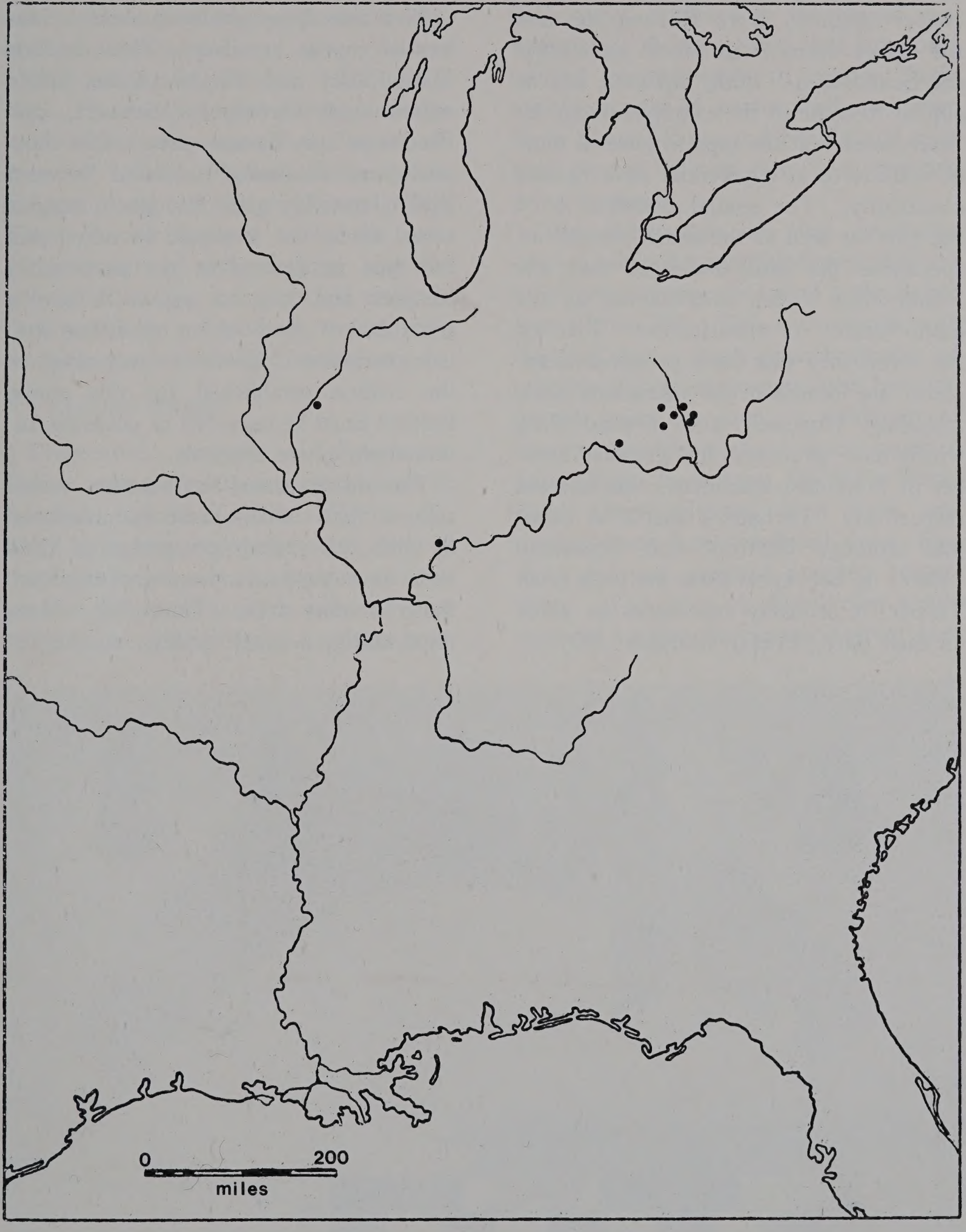

Figure 8. Distribution of headplates at Hopewell mortuary sites

found in Hopewell mortuary contexts at nine sites (Figure 8). Only the plain copper specimen from Havana site and the effigy form from Mann lie outside the Scioto area. Both, however, are so similar to some of the examples from the Scioto area that the type in general must be considered as a potential interregional commodity. The spatial distribution of the type, as well as the actual number of specimens per site, indicates that the Scioto–Paint Creek area served as the major center of manufacture. Five of the seven sites that have produced headplates are located in the immediate area, including Hopewell and Mound City which have produced the greatest number of individual specimens, nine and six respectively. Perhaps it should be noted that although Shetrone and Greenman (1931) do not report these artifacts from Turner, it probably represents an error on their part (Prufer 1961a, p. 390).

6. Tinklers

Five sites have produced conical tinklers of copper or silver. These include Mound City and Turner of the Scioto region and Davenport, Schwert, and Flucke in the Havana area. The morphological similarity exhibited between sites is certainly great enough to suggest actual trade, but it should be noted that the type in general is not particularly complex and does not appear to have a great deal of potential for exhibiting stylistic variation. However, according to the criteria established for this study, tinklers must be regarded as potential Interaction Sphere artifacts.

The distributional information would suggest that tinklers were manufactured in Ohio. A greater percentage of Ohio sites have produced these artifacts than those in other areas (Table 12). More importantly, a much greater number of

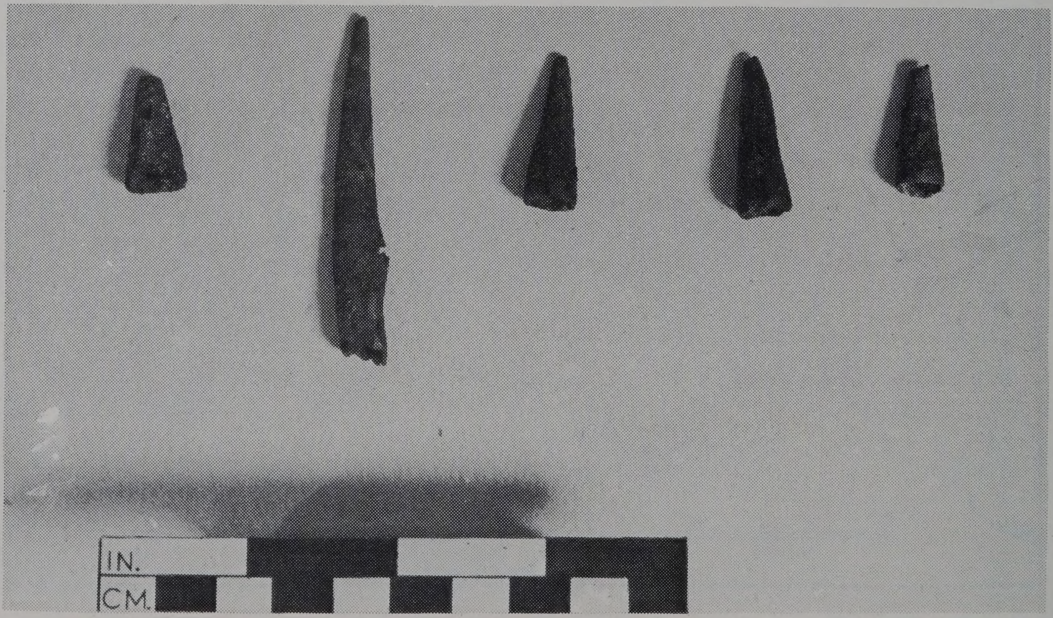

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PLATE VI. Tinklers

individual tinklers have also been recovered from Ohio sites. Turner stands out in this regard, having produced several hundred copper and silver tinklers (Willoughby and Hooton 1922, Plate 12a). In contrast, this study was able to document only one from Davenport, "several" from Flucke, twelve from Schwert, and six from Mound City. Thus, Turner appears to be the most likely center of manufacture, and the only evidence for extraregional trade in these artifacts comes from the extreme northern portion of the Havana area.

7. Crescent gorgets

Crescentric gorgets of Interaction Sphere raw materials are represented at fourteen individual sites (Figure 9). They have been recovered from five of the eight major ceramic regions and appear to satisfy the criteria necessary for inclusion as an interregional artifact type. Stylistically, examples are quite similar across this range, but there are notable differences exhibited in the use of raw materials. Most of these sites have only yielded gorgets made of copper; however, examples of marine shell are known from Crystal River and Knight and crescent gorgets of mica have been reported from Tremper.

The distribution of sites producing crescent-shaped gorgets indicates they are much more frequently found in the Scioto area (Table 12). This is consistent with the fact that a much greater number of individual crescent gorgets have been reported from the area; a minimum of twenty specimens has been reported from Ohio. In contrast, the Santa Rosa–Swift Creek, Havana, New York, and Copena areas have produced three, five, two, and one crescent gorgets, respectively. This type of distribution would seem to suggest that most crescent gor-

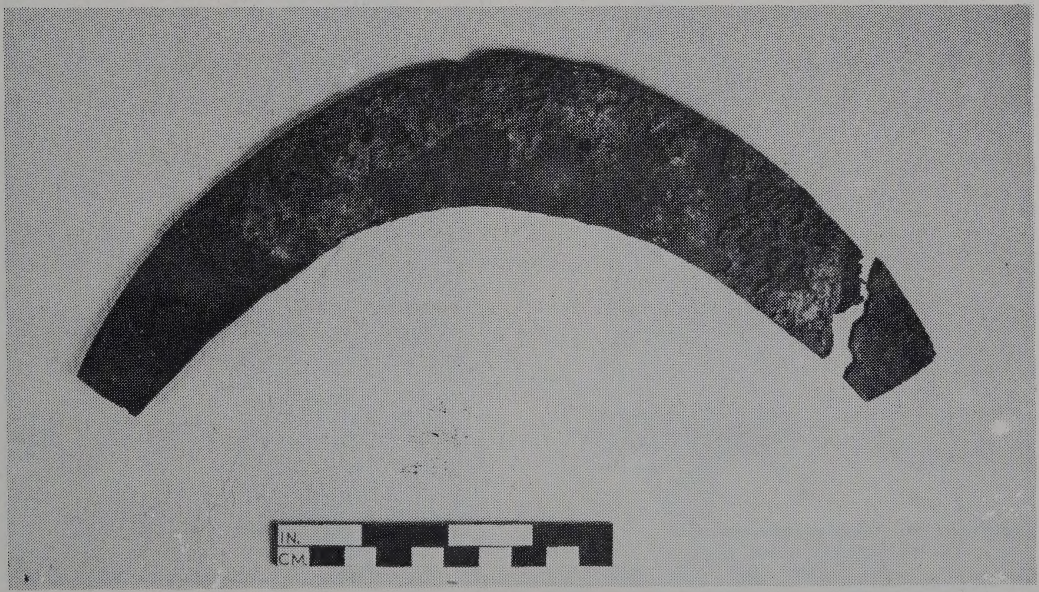

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PLATE VII. Crescent gorget

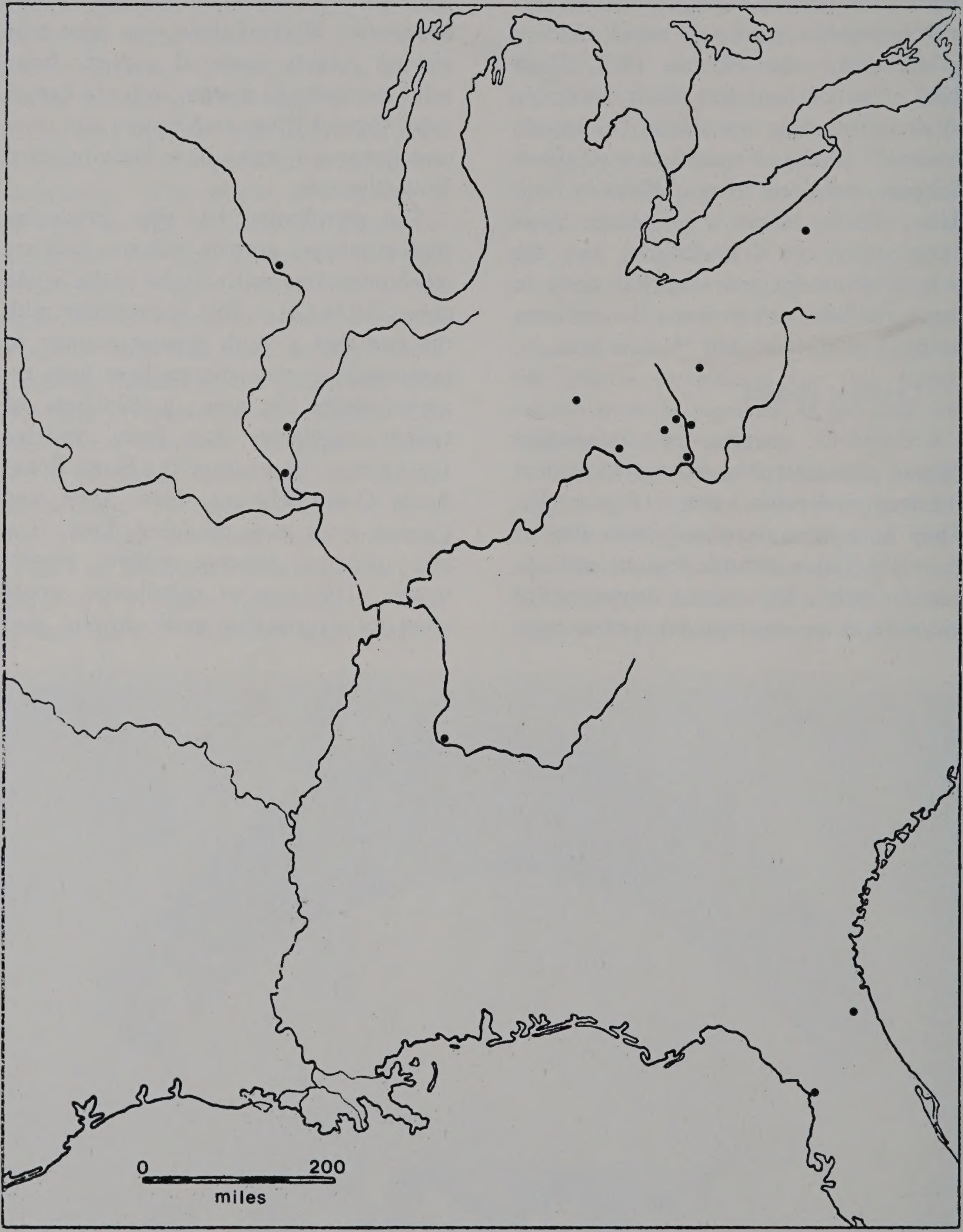

Figure 9. Distribution of crescent gorgets at Hopewell mortuary sites

gets were made in Ohio. Although most of these were "consumed" in the immediate area, a few may have been involved in interregional transactions.

8. Ross Barbed spears

In his review of the distribution of Hopewell obsidian, Griffin (1965, p. 117) defined the Ross Barbed spear as a diagnostic type. Unfortunately, his type description is somewhat vague. As recognized in this study, examples of this type are known from Mound City, Hopewell, Seip, North, Snyders, Flucke, and Caldwell. The "killed" midsection of a large, obsidian scimitar-shaped blade from North is perhaps questionable, but it does appear to be very similar in shape and chipping pattern to some of the Ross Barbed spears from Seip. Mica cutouts resembling these points have been found at several sites, but these are probably best classified as cutouts rather than Ross spears.

The distribution of Ross Barbed spears suggests that Ohio sites produced these artifacts more frequently than did those in the Havana region (Table 12). Further, in contrast to the three specimens known from the latter region, at least several dozen are known from Ohio. This, together with the stylistic similarity of the Ohio and Havana examples, suggests that Ohio was definitely the area of manufacture for artifacts of this type. On the basis of the number of points present as well as the massive quantity of obsidian debitage present, the Hopewell Site was probably the most important locus of production. The spatial distribution of Ross Barbed spears is shown in Figure 10.

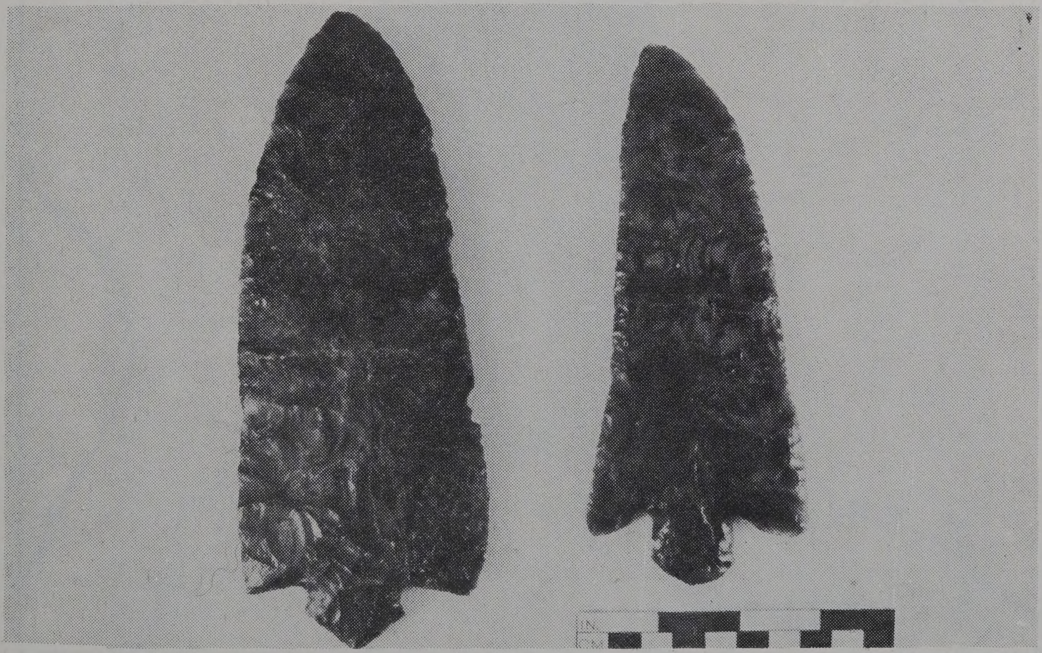

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PLATE VIII. Ross Barbed spears

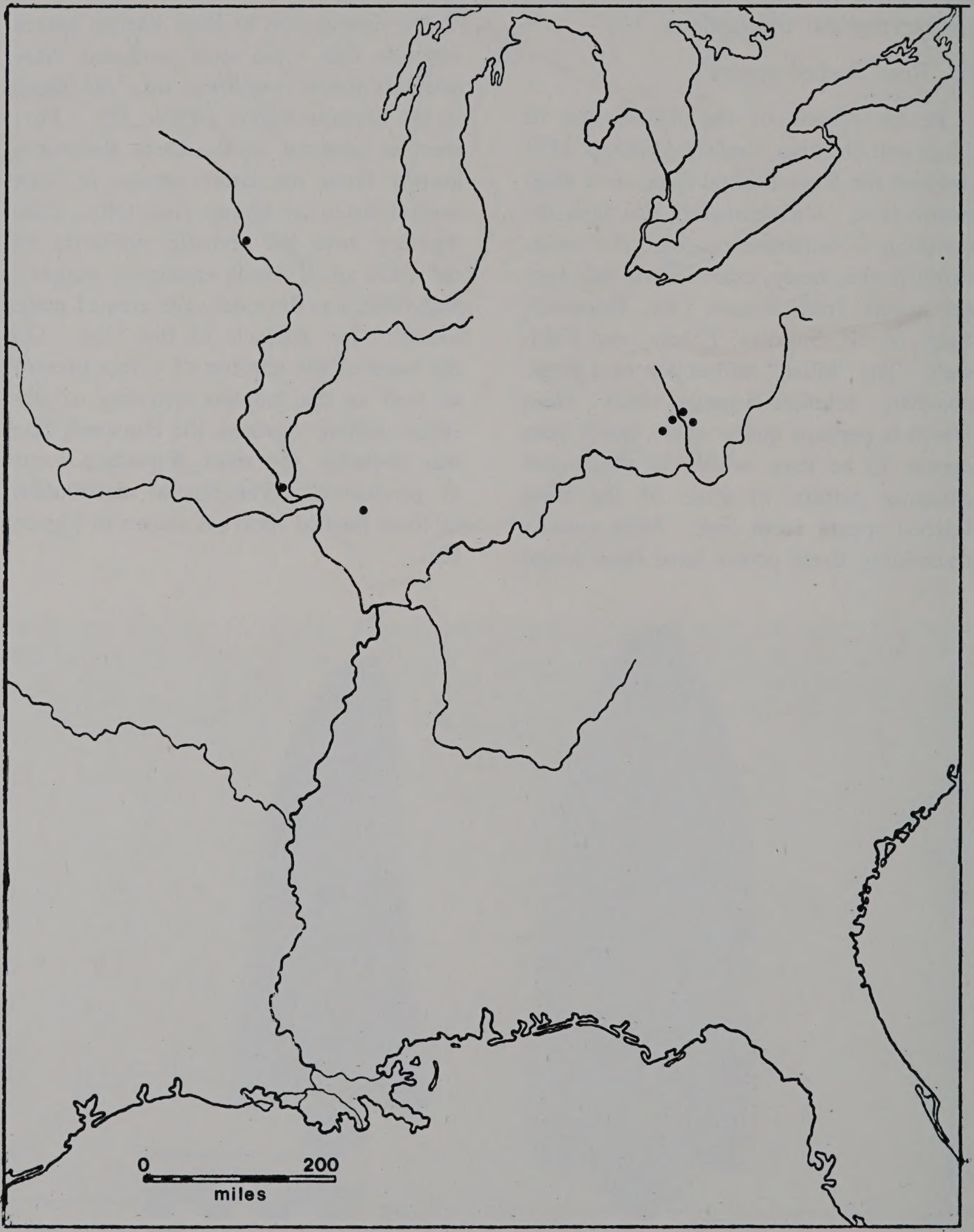
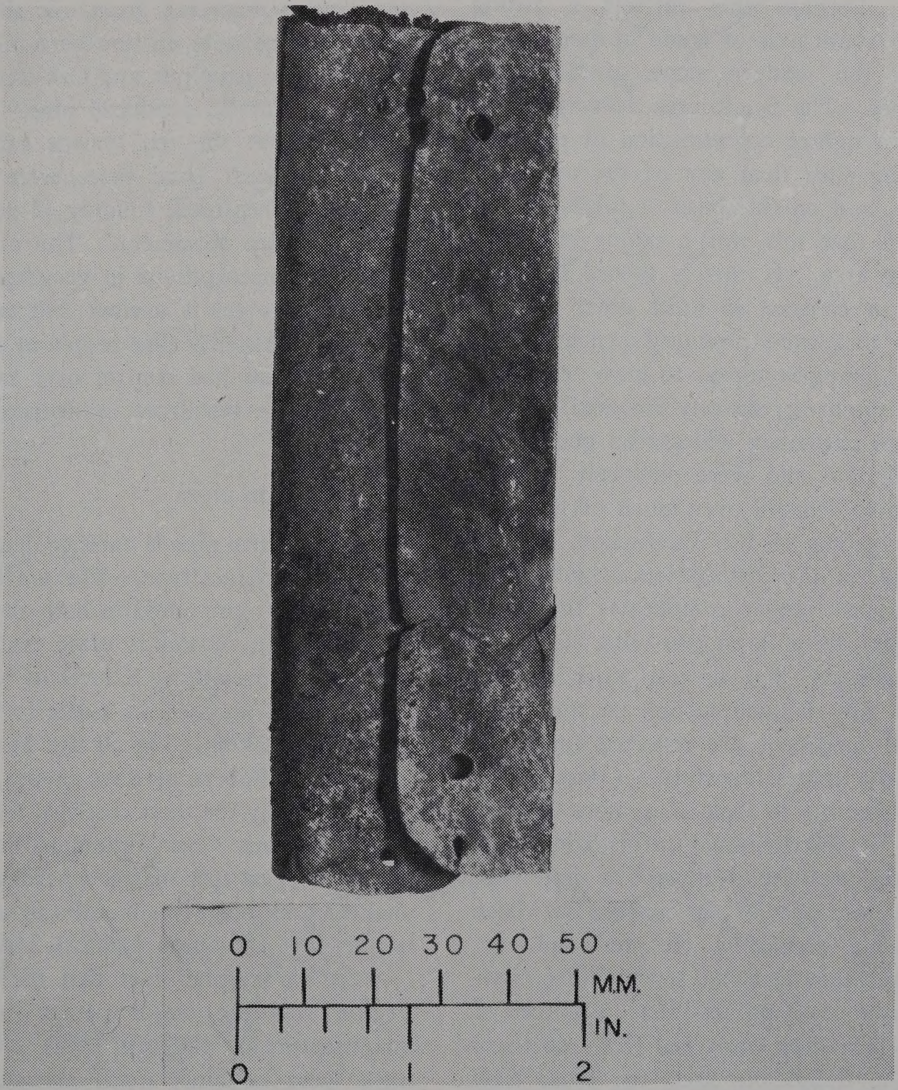


Figure 10. Distribution of Ross Barbed spears at Hopewell mortuary sites

9. Panpipes

Panpipes are one of the few artifact types that are uniquely Hopewellian; they do not appear earlier in the archaeological record nor are they found in later contexts. Their presence in Hopewell sites and in certain South American and Mesoamerican complexes has often been used to support the "Mesoamerican influence" theory of Hopewell origin (e.g. McMichael 1964). A total of thirty-three sites representing all of the major regional traditions has produced these artifacts (Figure 11). Although there are two-, three-, and four-tube panpipes, all are metal covered and appear superficially to be quite similar. All specimens



Museum of Anthropology, University of Michigan

PLATE IX. Panpipes

in the sample are considered as potential interregional trade goods.

The distribution of panpipes suggests several major patterns. First, sites yielding panpipes occur much more frequently in the Santa Rosa–Swift Creek and Miller–Porter complexes of the Southeast and in the Scioto area to the north than in any of the other regions (Table 12). Perhaps this reflects a strong north/south axis of trade in these goods along the western slope of the Alleghenies. The Scioto area does appear to have a tighter concentration of panpipe-bearing sites than any of the other regions, and on this basis it might be expected that this was a major manufacturing area. If this is indeed the case then in contrast to most other artifact types that were produced principally in Ohio, panpipes appear to have "escaped" from the area relatively frequently. They had an extremely widespread geographic distribution and were obviously in considerable demand over much of the area participating in the Interaction Sphere. A look at the distribution of individual specimens further complicates the issue.

Panpipes, with copper celts, earspools, reel gorgets, and several other artifact types, are distinct enough so that individual specimens are reported fairly accurately in the literature. Consequently it is possible to look at a more specific level of distributional information than just the presence or absence at sites. The actual number of specimens has been relatively accurately recorded and currently stands at about seventy (see Griffin *et al.* 1970, pp. 98-115). Eighteen of these have been recovered from mortuary sites in the Scioto area, ten from New York, eleven from the Copena area, eleven from Santa Rosa–Swift Creek, two from Crab Orchard, thirteen from Havana, three from Miller-Porter, and two from Marksville. The number of artifacts per region roughly parallels their presence/absence frequency at sites within each region in all cases except the New York and Copena situations. In both of these cases a considerable number of panpipes were recovered from one site; the Tunacunnhee Site in northern Georgia produced ten panpipes, and LeVesconte in southern Ontario produced nine. These together with the ten known examples from Hopewell (and there were probably more) represent roughly 41 per cent of the known specimens. The meaning of these concentrations in geographically widespread areas is unclear, but may reflect the possibility that people or groups in these areas had control over tangible or intangible resources in demand elsewhere.

10. Platform pipes

The platform pipe is another diagnostic Hopewell artifact type. The craftsmanship that is represented in both the plain and the effigy forms is often truly outstanding, representing a level of artistry never again attained in Eastern Woodland pipe making. Of all the Hopewell Interaction Sphere artifact classes, pipes were probably the most costly in terms of manufacturing time. Ethnohistorical accounts suggest that master Cherokee pipe makers took over two months to make a single pipe (Swanton 1946, p. 546).

It is an accepted fact that the Scioto region was the major center for the manufacture of platform pipes, although they were certainly made elsewhere as well. Tremendous caches of these arti-

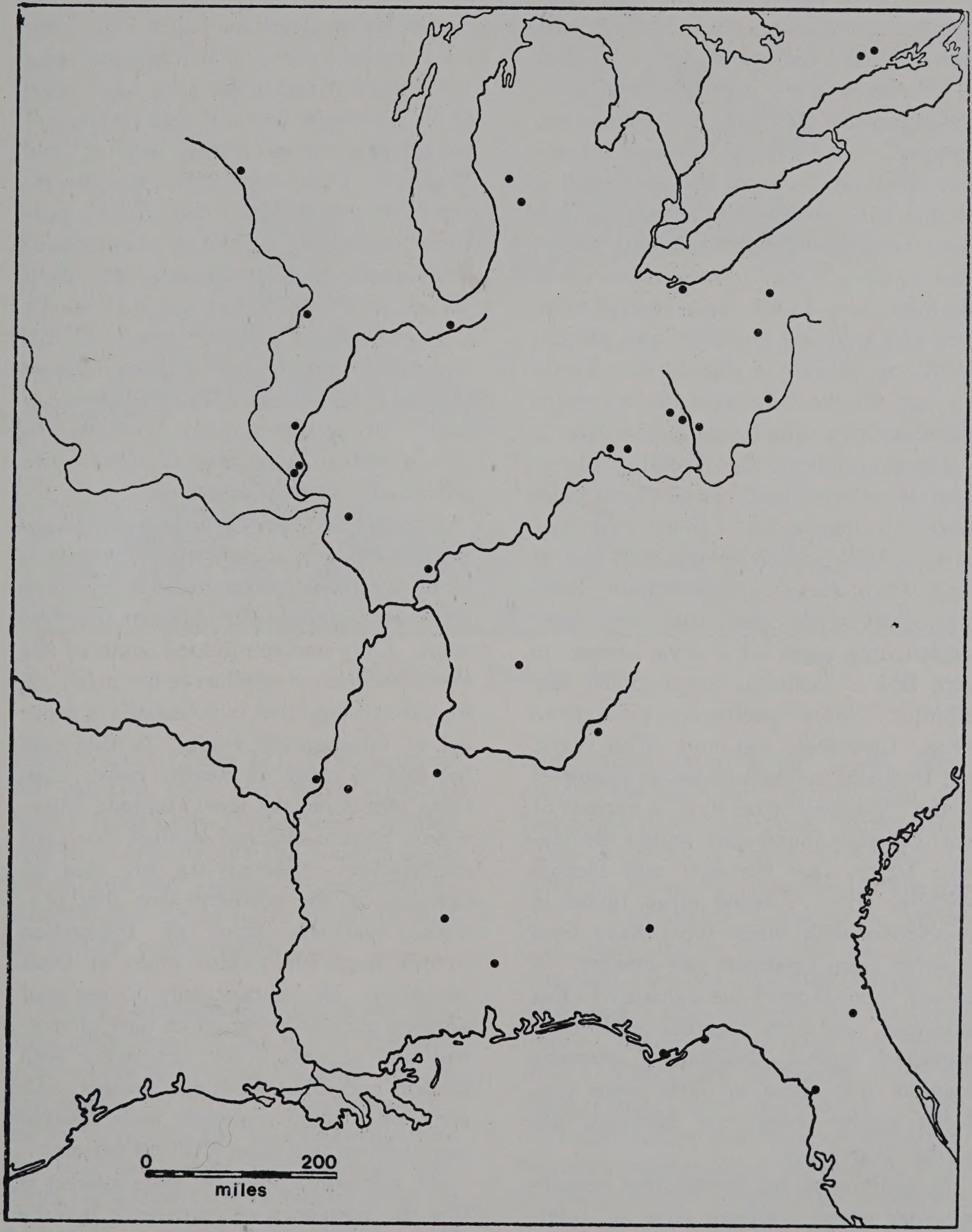


Figure 11. Distribution of panpipes at Hopewell mortuary sites

facts, predominantly made of Ohio pipestone and limestone, were conspicuously consumed at Tremper and Mound City. Because in both cases the individual pipes were "killed" and subjected to the heat of crematory fires, it is difficult to accurately assess the number of pipes represented. At Tremper there were probably about one hundred and forty and at Mound City over two hundred. In any case, these two sites stand in marked contrast to most other Hopewell sites where platform pipes do not occur in large numbers and have led Struever and Houart (1972, pp. 69-71) to suggest that Tremper and Mound City were in fact major manufacturing centers for these artifacts.

The data indicate that a total of thirty-eight sites have produced platform pipes made of Interaction Sphere raw materials. It is possible to eliminate five of these from further consideration, however, due to the fact that they have yielded only pipes of a style known to have had a localized, intraregional distribution. More specifically, pipes from Utica, Liverpool, LeCount, Upp-Wark, and Dickison can be isolated as examples of the "V-based" pipe style, a variety of platform pipe found only within the Havana region (see Struever and Houart 1972, p. 76). V-based pipes found in association with other types have been reported from Frederick and Peisker. All known V-based pipes were made of Ohio pipestone, and this together with their restricted spatial distribution strongly suggests that these artifacts were produced locally using raw materials imported from Ohio.

In addition to the thirty-three remaining sites where platform pipes of Interaction Sphere raw materials have been found, five additional sites were included because the pipes found there exhibit a very strong stylistic similarity to examples known from the major Ohio sites. Included here would be the limestone pipe from Pete Klunk, the gray slate pipe from Anderson, and the "indeterminant" stone pipes from Baehr, Naples, and Rodgers. Thus, thirty-eight sites are included as potentially having yielded platform pipes that represent interregional trade goods. This represents only about 43 per cent (38/88) of the sites known to have produced platform pipes. Of the remainder, many were excluded because the raw material and general morphology could not be determined. Perhaps future studies will be able to work more adequately with this material.

The distribution of platform pipes suggests several major patterns (Figure 12). First, the interregional trade in platform pipes was principally a northern phenomenon. Only one site located south of the Ohio–Mississippi confluence has produced a platform pipe that is potentially a product of interregional trade. In this case the pipe is made of steatite rather than Ohio pipestone, the most common Interaction Sphere material utilized for pipe manufacture. Seventy-six per cent of the sites in the northern area that produced platform pipes of Interaction Sphere materials yielded pipes of Ohio pipestone. In contrast, only 15 per cent of these sites produced pipes only of steatite, and at only 9 per cent were both steatite and Ohio pipestone present. All sites where both materials were utilized were located in Ohio (3/33=9 per cent).

An additional point of some interest is that the frequency of occurrence is quite similar for the Scioto, Crab Orchard, and

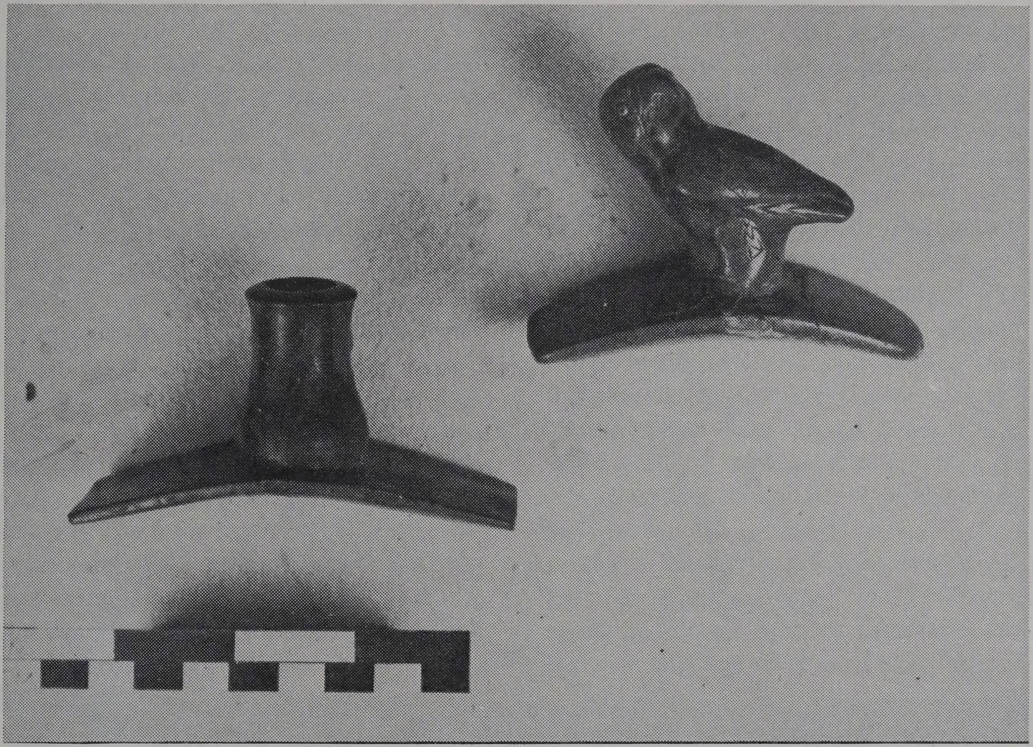


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PLATE X. Platform pipes

Havana areas (Table 12). This suggests that platform pipes were being regularly traded from Ohio to the west. Within both the Crab Orchard and Havana areas, the distribution appears to be relatively homogeneous from north to south with no obvious concentrations.

Finally, although platform pipes were apparently being traded out of the Ohio area relatively frequently, when the actual number of pipes is examined, it becomes clear that the vast majority were for local use. Over four hundred platform pipes have been recovered from the Ohio mortuary sites in the sample. This is in marked contrast to the eight pipes representing interregional trade documented for the Crab Orchard area, the four pipes from New York, the two from Santa Rosa–Swift Creek sites, and the forty-one examples from the Havana region. With regard to the latter region, it is interesting to note that two of the forty-one recorded pipes came from the Kaskaskia Valley, eleven from the lower Illinois Valley, eleven from the central Illinois Valley, and seventeen from the upper Illinois and Mississippi valleys. This distribution indicates a widespread, relatively homogeneous distribution within the area and is generally supportive of the pattern suggested by the qualitative analysis.

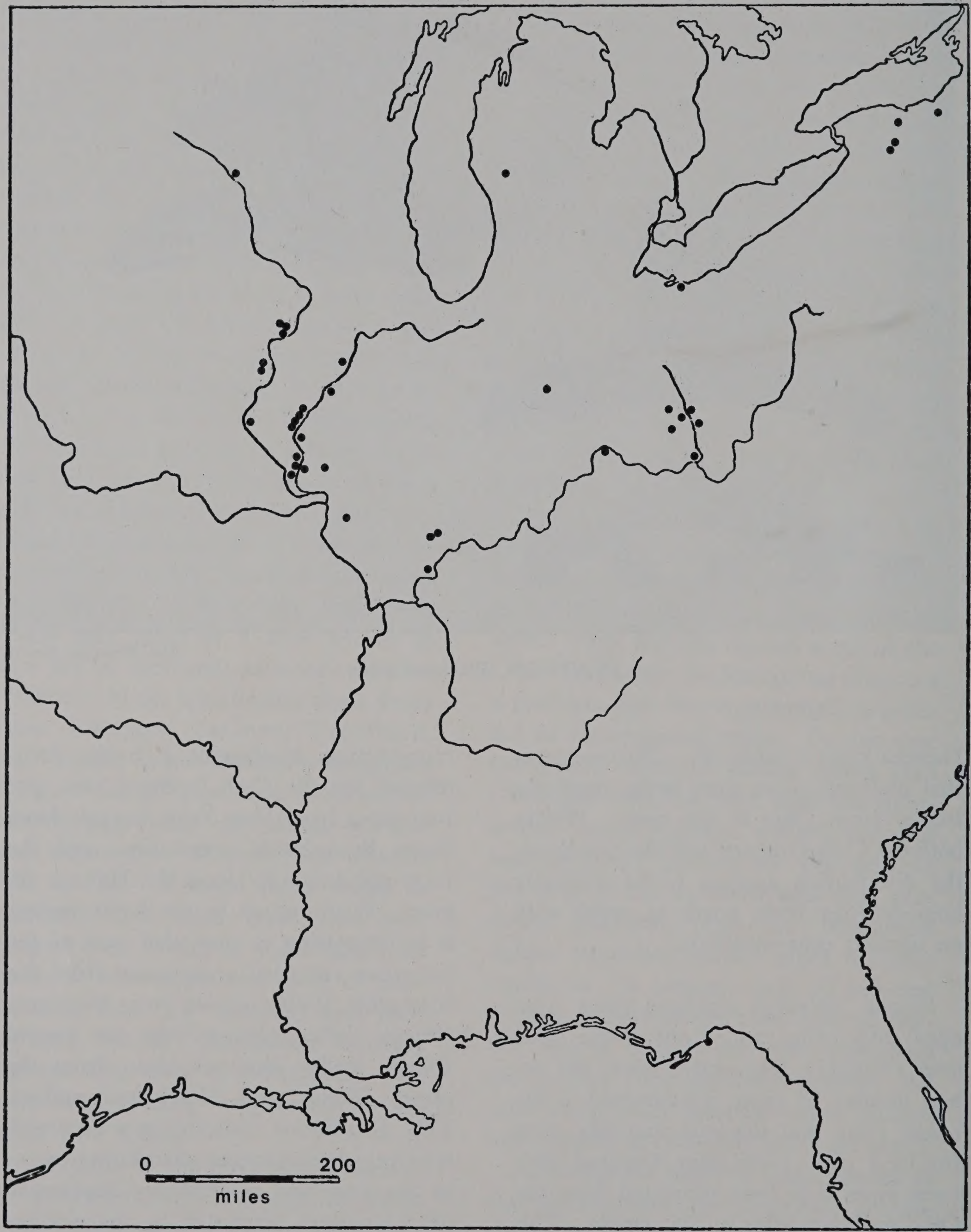

Figure 12. Distribution of platform pipes at Hopewell mortuary sites

11. Mirrors

Eighty-six sites in the sample yielded trimmed mica sheets or mirrors. Due to the fact that little modification was necessary to produce these artifacts, there are very few cultural attributes present on a given specimen that would allow the detection of stylistic variability across the distributional range. Consequently, all mica mirrors are considered in this study as potential interregional items of exchange.

The distributional pattern of sites yielding mirrors indicates that these artifacts were of considerable importance over much of the area participating in the Interaction Sphere (Figure 13). The major exceptions in this regard would be the Marksville, Copena, and possibly the Miller-Porter areas of the South (Table 13). Their occurrence is relatively homogeneous within all regions except Marksville and Havana. In the former case, mica mirrors have been found only in the northern portion of the area, and in the latter are concentrated in the lower and central Illinois Valley.

Struever and Houart (1972, pp. 69, 71, 74) have argued that the Scioto area was a major locus for the importation of mica from the southern Appalachians. They further suggest that it was here that the mica "books" were separated and trimmed into the finished product and subsequently traded throughout the Northeast and Midwest. The extremely high percentage of Scioto sites that have produced these artifacts lends some credibility to this argument. The hypothesis gains additional support from the fact that not only are these artifacts found at

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PLATE XI. Mica mirror

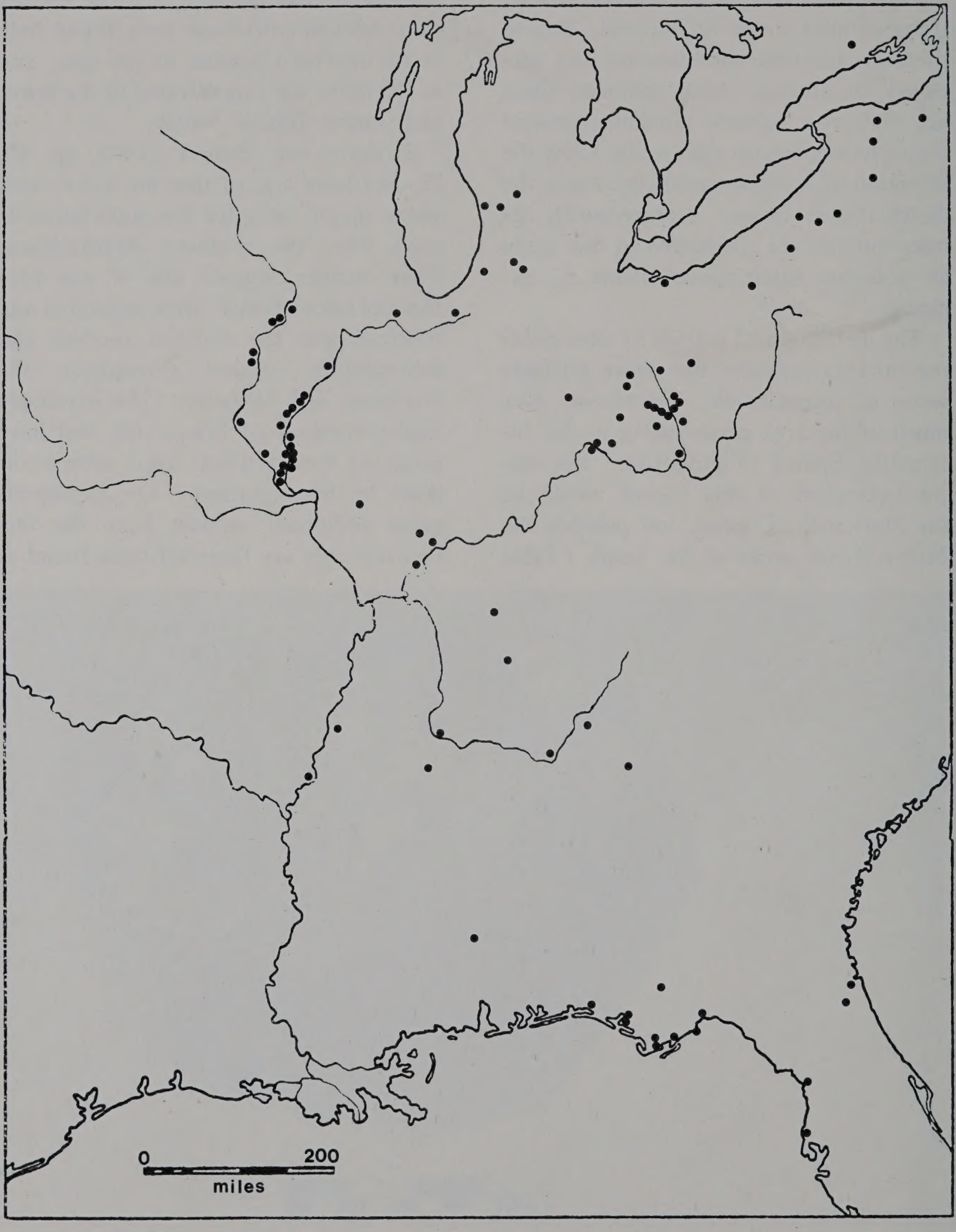

Figure 13. Distribution of mirrors at Hopewell mortuary sites

a large number of Ohio sites, they are found in huge quantities at several of them. For example, hundreds of trimmed mica sheets were recovered from Mound City 13, Mound City 7, and Fort Ancient. Squier and Davis (1848, p. 72) note that a mound at Newark, Ohio, produced between fifteen and twenty bushels of mica in association with fourteen extended burials. However, the distributional information would also suggest the possibility that mica mirrors were traded to the Havana and Crab Orchard regions directly from the quarries without necessarily funnelling through Ohio. A continuous band of sites that has produced these artifacts extends from the Appalachian quarries northwest to the Illinois country. Further, these sites appear to be highly correlated with the distribution of known historic trails in the area connecting these two geographic areas (see Myer 1928, Plate 15).

12. Pulley earspools

Pulley earspools present several interesting problems. Examples are known to have been made of pottery, bone, and wood as well as such Interaction Sphere materials as cannel coal, steatite, and Ohio pipestone. Further, the range of stylistic attributes on the specimens made of exotic and nonexotic materials shows considerable overlap. Bone and wood examples are found only in the Havana area and are considered local products. Pottery and stone pulley earspools, however, have been found in the Scioto, Crab Orchard, and Havana regions. The pottery and stone spools are found in direct association in Alter Three at Hopewell 25 and in a cache at Rutherford. Thus, it would seem that pottery earspools must be considered as potential Interaction Sphere artifacts along with their stone counterparts according to the criteria

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PLATE XII. Pulley earspools

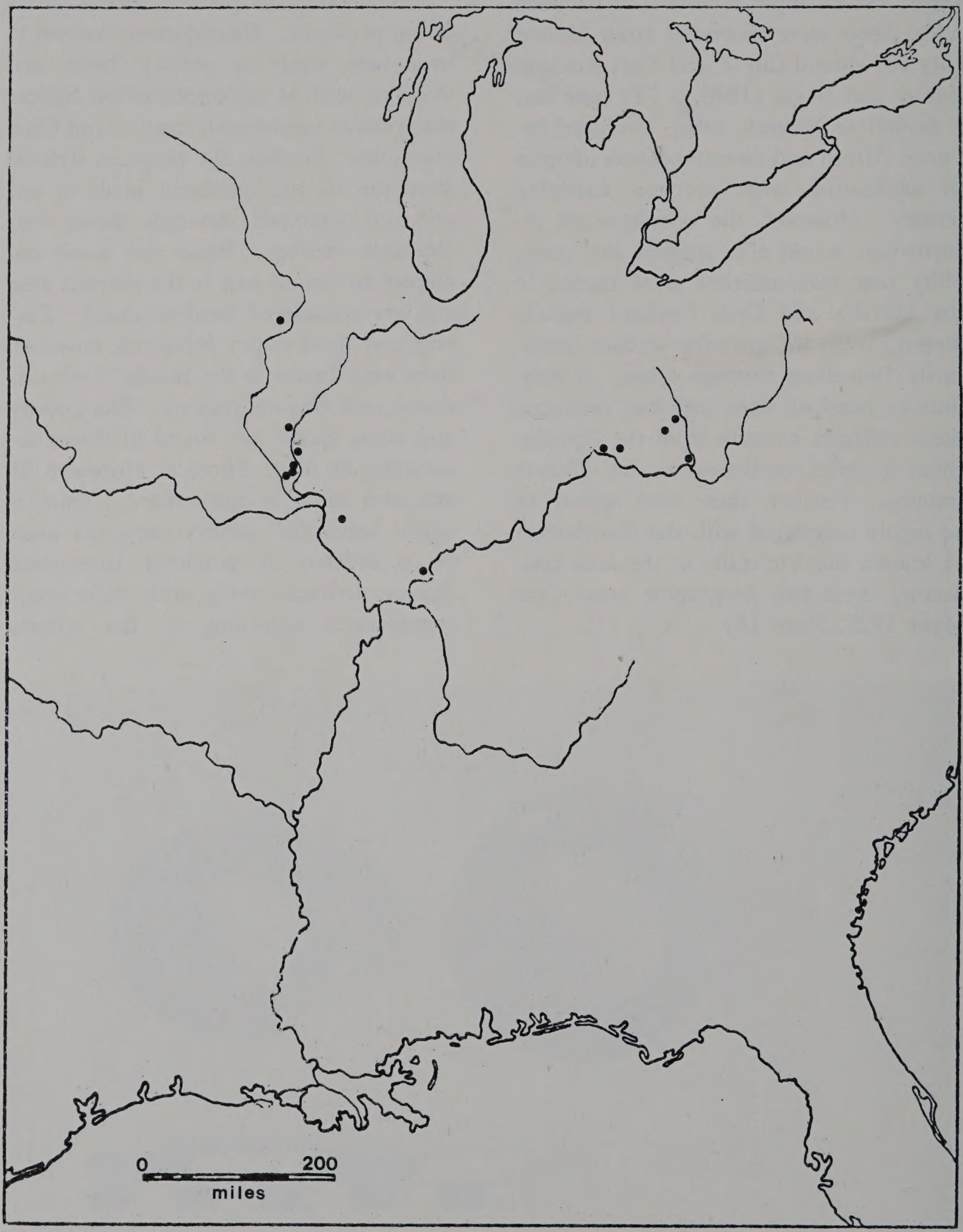


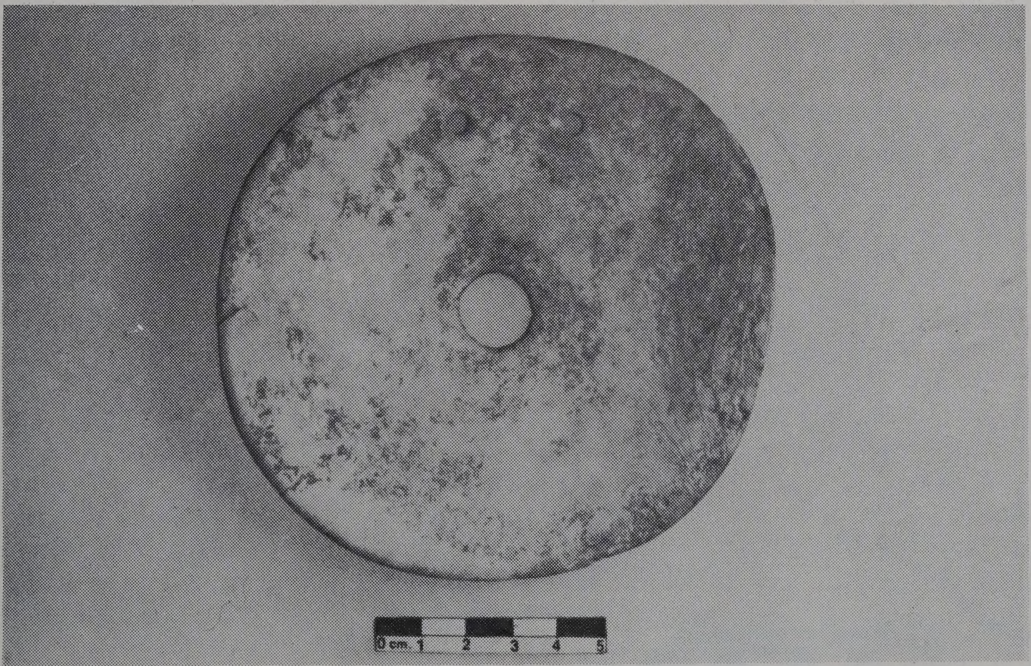
Figure 14. Distribution of pulley earspools at Hopewell mortuary sites

established in this study. There is certainly a precedent established for this argument (Struever and Houart 1972, p. 74). It should be noted, however, that the manufacturing cost, and ultimately the social "value" of the pottery and stone spools, can be expected to have been quite different; the stone spools represent at least several days of work, the pottery spools less than an hour.

Thirteen sites have produced earspools of potential interregional significance (Figure 14). Six of these have yielded only pottery specimens, three have produced only stone spools, and four sites have produced examples of both the "cheap" and "expensive" pulley earspools.

The present evidence suggests that Ohio was the center of manufacture for the stone specimens. It is here that they are found in the greatest range of raw materials, in the largest percentage of sites, and in the greatest numbers. Hopewell 25 alone produced at least fourteen. It is interesting to note, however, that the extremes of the morphological range of this type are represented in the nine specimens found in a single cache at Rutherford. This in combination with the availability of cannel coal, a favored raw material for the production of these artifacts, suggests that the Crab Orchard area may have also produced this type of ornament.

Struever and Houart (1972, pp. 74-75) have suggested that the pottery spools were produced in the lower Illinois Valley and exported to other regions. Further, Griffin *et al.* (1970, pp. 96-97) suggest they are common in the lower Illinois Valley and can almost be considered as a locally specific artifact. These con-



Black Laboratory of Archaeology, Indiana University

PLATE XIII. Shell pendant

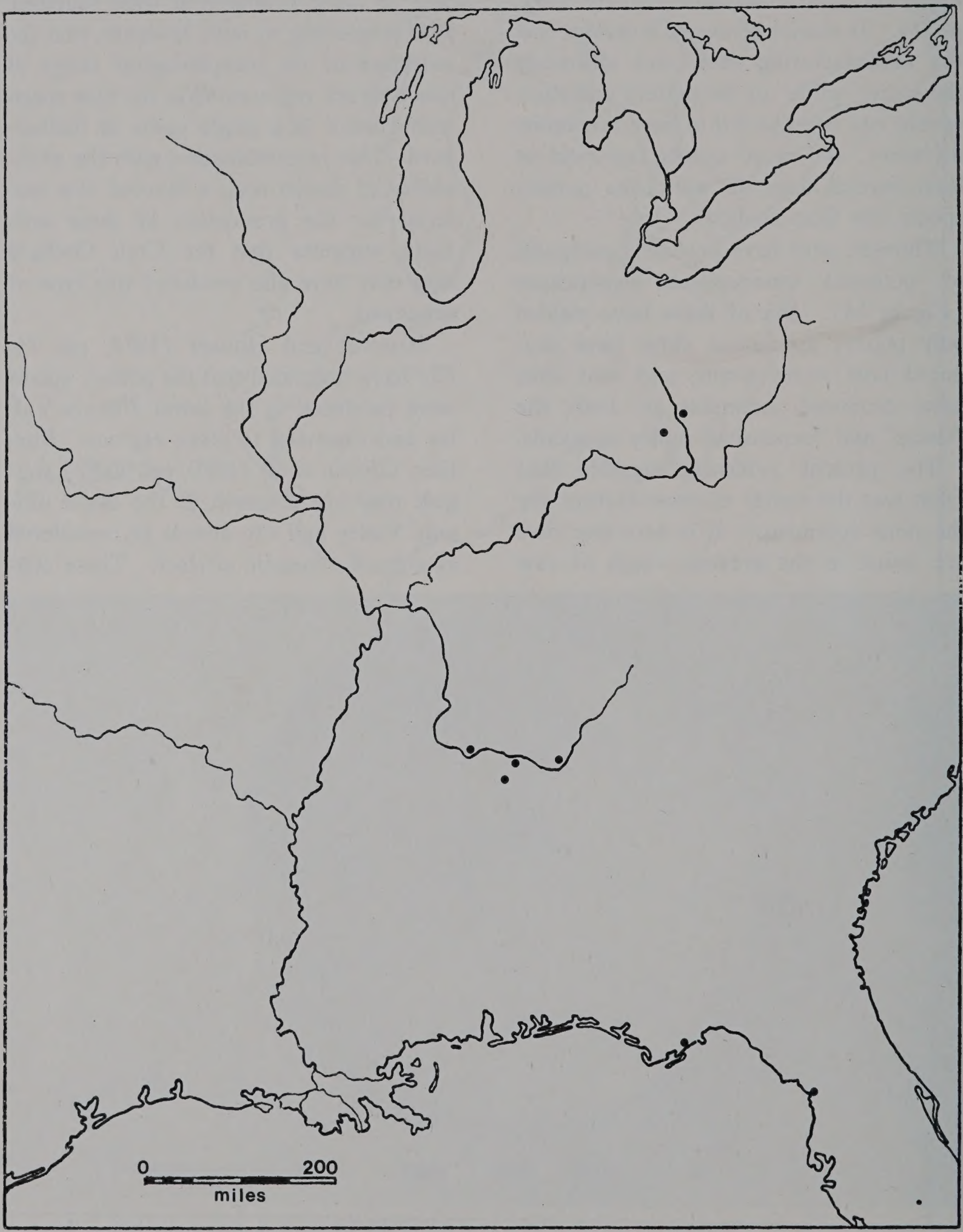


Figure 15. Distribution of circular pendants at Hopewell mortuary sites

clusions are not supported by the present study which would indicate that six of the nine sites that have produced pottery pulley earspools are located outside the lower Illinois Valley.

13. Circular pendants

Circular pendants with central perforations are known from eight sites (Figure 15). In all cases these appear to have been made of marine shell. There is not sufficient diversity within the sample to omit cases as regionally unique. Hence, all of these pendants are considered as potential Interaction Sphere artifacts.

Pendants of this type are found in the Scioto, Copena, and Santa Rosa–Swift Creek areas. They occur at roughly the same percentage of sites in each area (Table 12). The actual number of these pendants, however, shows considerable variation among regions. A minimum of fifty-five examples was recorded for Ohio, four for the Tennessee Valley, and five for the Gulf Coast. This distribution suggests that many of these artifacts were made in Ohio. However, this interpretation is compromised by the fact that several of the Gulf Coast specimens represent secondary stages of manufacture rather than finished products.

14. Reel-shaped gorgets

Twenty-two sites have yielded reel-shaped gorgets. At all sites except Havana, Tremper, and Turner these gorgets are made solely of copper. The stone gorgets from these three sites are made of different raw materials, but share a basic stylistic relationship. In contrast to the copper specimens, the gorgets from these sites have very abbreviated "arms" which constrict distally to stubby points (see Willoughby and Hooton 1922, p. 86; Mills 1916, pp. 369, 371, 373; Baker *et al.* 1941, Plate 4). They are, therefore,

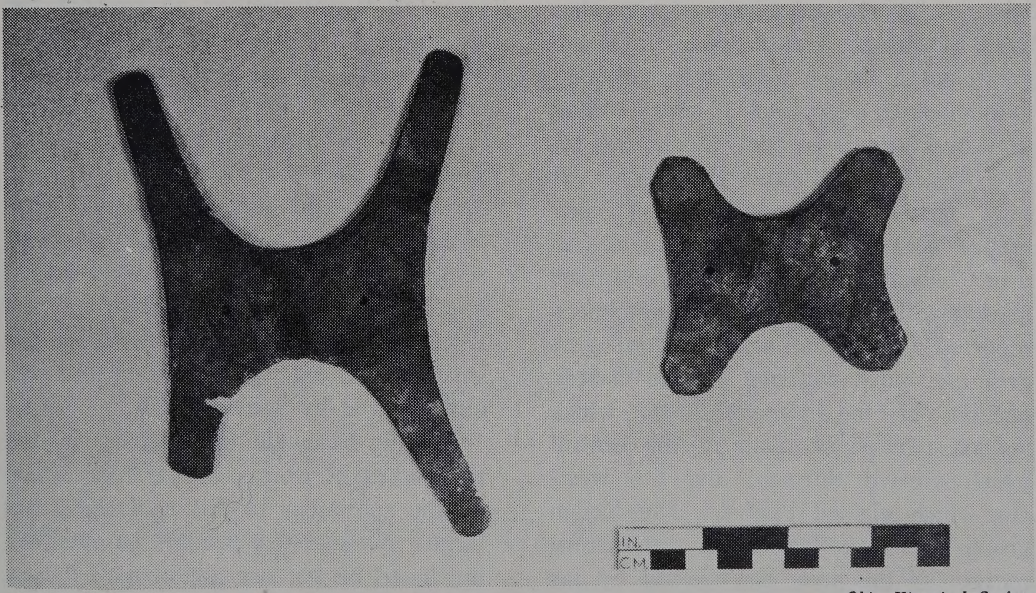


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PLATE XIV. Reel-shaped gorgets

eliminated from consideration as potential trade goods. Of the twenty sites that have produced reel-shaped gorgets made of Interaction Sphere raw materials, several have produced specimens that are somewhat aberrant; for example, the relatively wide, short-armed gorgets from Jonas Short and Tremper. Although these reels are quite similar to the specimen excavated by Thomas (1894, p. 426) from the Adena Great Smith mound, the style can also be duplicated in the Copena area, where quite clearly the widest range of variation within the type is exhibited (see Webb 1941, pp. 205, 208). All of the sites yielding copper specimens are therefore included in the analysis as producing potential items of interregional exchange (Figure 16).

There is considerable support for the position that copper reel-shaped gorgets were products of the central Tennessee Valley. It is here that these artifacts exhibit the greatest range of stylistic variation. Also, the percentage of sites that have produced copper reels is much greater here than in other areas, although no obvious concentration of sites yielding these artifacts is evident within the region (see Figure 16 and Table 12). At least fifty-one individual copper reel-shaped gorgets have been found in Copena burial mounds. This contrasts markedly with the paucity of specimens reported from other areas. These gorgets are more common in the eastern portion of the Copena area, which yielded twenty-six, than in the central which yielded thirteen, and the western which yielded twelve. The Roden group, which is located in the eastern portion of the area, has yielded by far the greatest number of individual gorgets, a total of sixteen.

Copena reel-shaped gorgets were primarily "consumed" in the area, although the evidence suggests weak vectors of trade to the southwest and somewhat stronger ties to the Scioto area to the north. Single specimens are known from the Marksville and Miller-Porter regions. Seven of these gorgets can be documented for Hopewell mortuary contexts in Ohio: three from Tremper, one from Hazlett, two from Fort Ancient, and one from Newark. The Ohio figures are perhaps somewhat conservative. Webb (1941, pp. 197-201), for example, notes a number of other occurrences in the Scioto area, including a reference to a half bushel of these artifacts which were excavated near the mouth of the Scioto River, but were subsequently smelted down.

It is necessary to emphasize that there are no reel-shaped gorgets reported from Mound City. Struever and Houart (1972, p. 71) suggest otherwise and use this piece of misinformation to support the hypothesis of a reciprocal trade in pipes between Mound City and Tremper. Their error no doubt stems from an ambiguous reference in Shetrone and Greenman's (1931, p. 507) trait list to the presence of six 'X-shaped' gorgets at Mound City. None of the primary sources, however, suggest that there were true reel-shaped gorgets at the site, and Shetrone and Greenman's reference is probably to the small, four-holed copper cross-shaped cutouts figured by Mills (1922a, p. 371).

Finally, it should be pointed out that the amount of worked copper represented by the specimens in this analysis is not large. No actual data could be obtained, but based on the size and shape of these artifacts it is reasonable to assume that

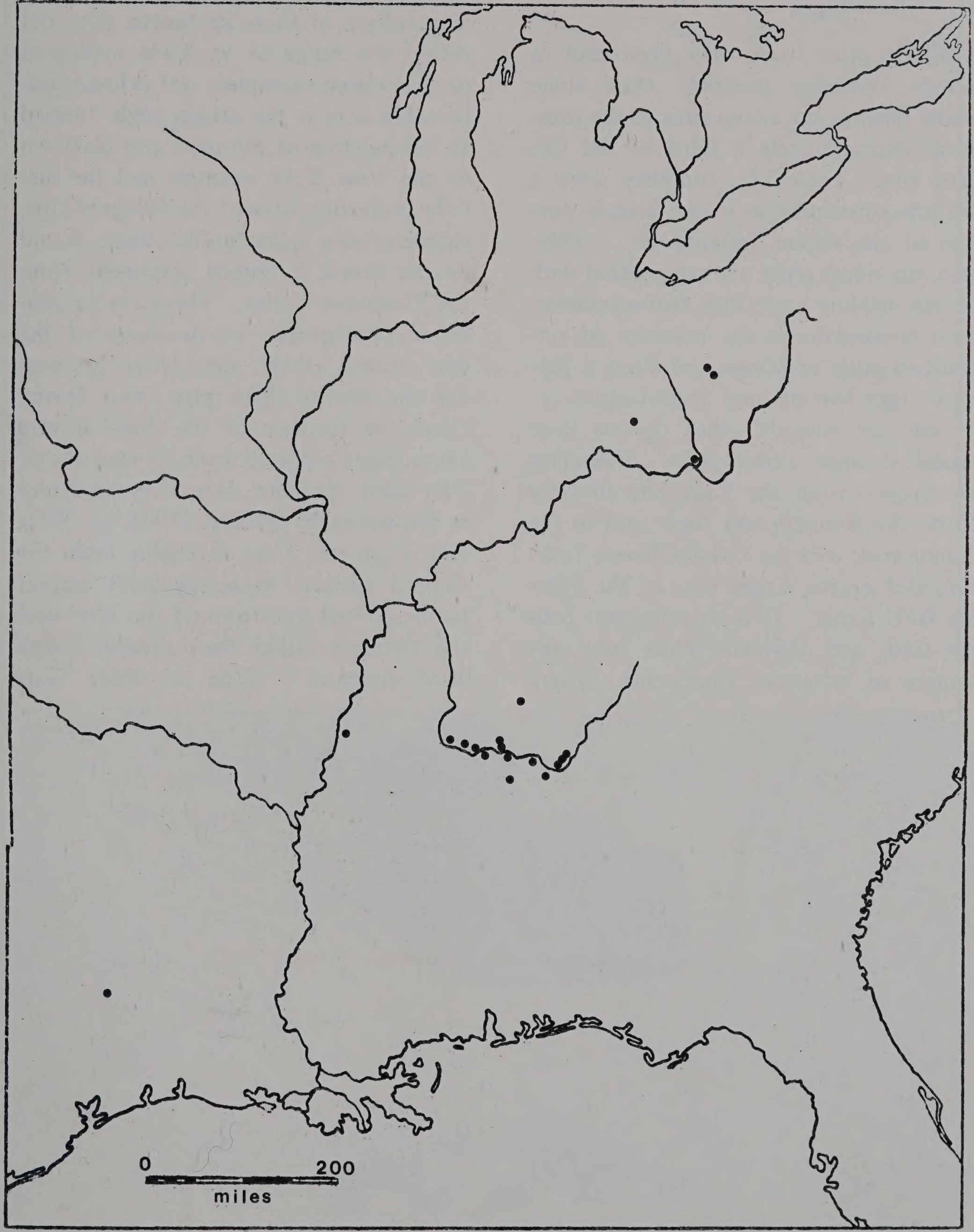

Figure 16. Distribution of reel-shaped gorgets at Hopewell mortuary sites

something less than twenty pounds of copper is represented.

15. Elbow pipes

Elbow pipes were also apparently a middle Tennessee product. Plain stone elbow pipes occur at ten sites in the area, or at approximately a third of the Copena sites (Table 12), and they show a definite concentration in the central portion of the region (Figure 17). Thirteen individual pipes are represented with no site yielding more than two specimens. Also noteworthy is the presence of unfinished pipes at Mingo and Ross, a pattern suggestive of local manufacture.

Only six sites in other regions have produced stone elbow pipes. Examples are known from the Cain Site in New York, the Rodgers and Esch sites in the Scioto area, and the Crystal River, Jackson, and Spring Creek sites of the Florida Gulf Coast. It is safe to omit both the Cain and Rodgers pipes from the sample of potential Interaction Sphere artifacts. In addition to their isolated location and the fact that they are made of locally available materials, the general morphology of these specimens does not reflect the range of variation evidenced in the Copena examples. Of primary importance here is the obtuse angle formed at the junction of the bowl and platform on the New York example and the distally projecting base of the Rodgers pipe, characteristics quite unlike those found on the simple L-shaped specimens from the Tennessee Valley. There are no published photographs or drawings of the one steatite elbow pipe from Jackson, the one steatite elbow pipe from Spring Creek, or for two of the three steatite elbow pipes reported from Crystal River. The third specimen from Crystal River is illustrated by Moore (1903, p. 395), and it appears a bit divergent from the Copena pattern, especially with respect to the incised lines around the bowl and the rounded rather than squared base/bowl juncture. None of these Gulf

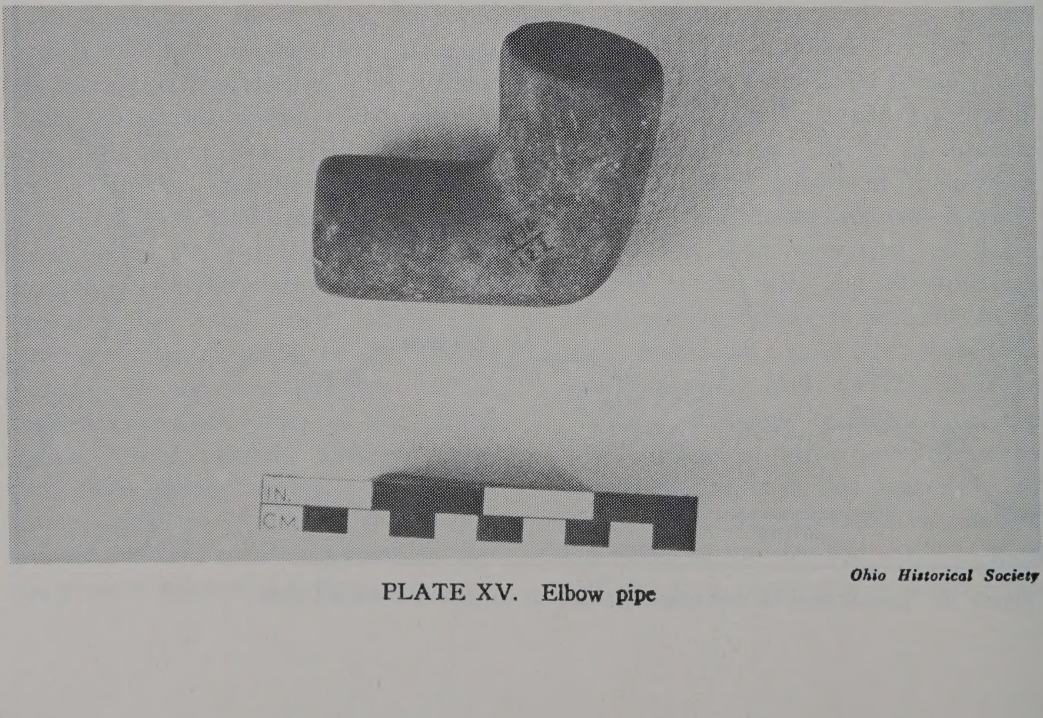

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PLATE XV. Elbow pipe

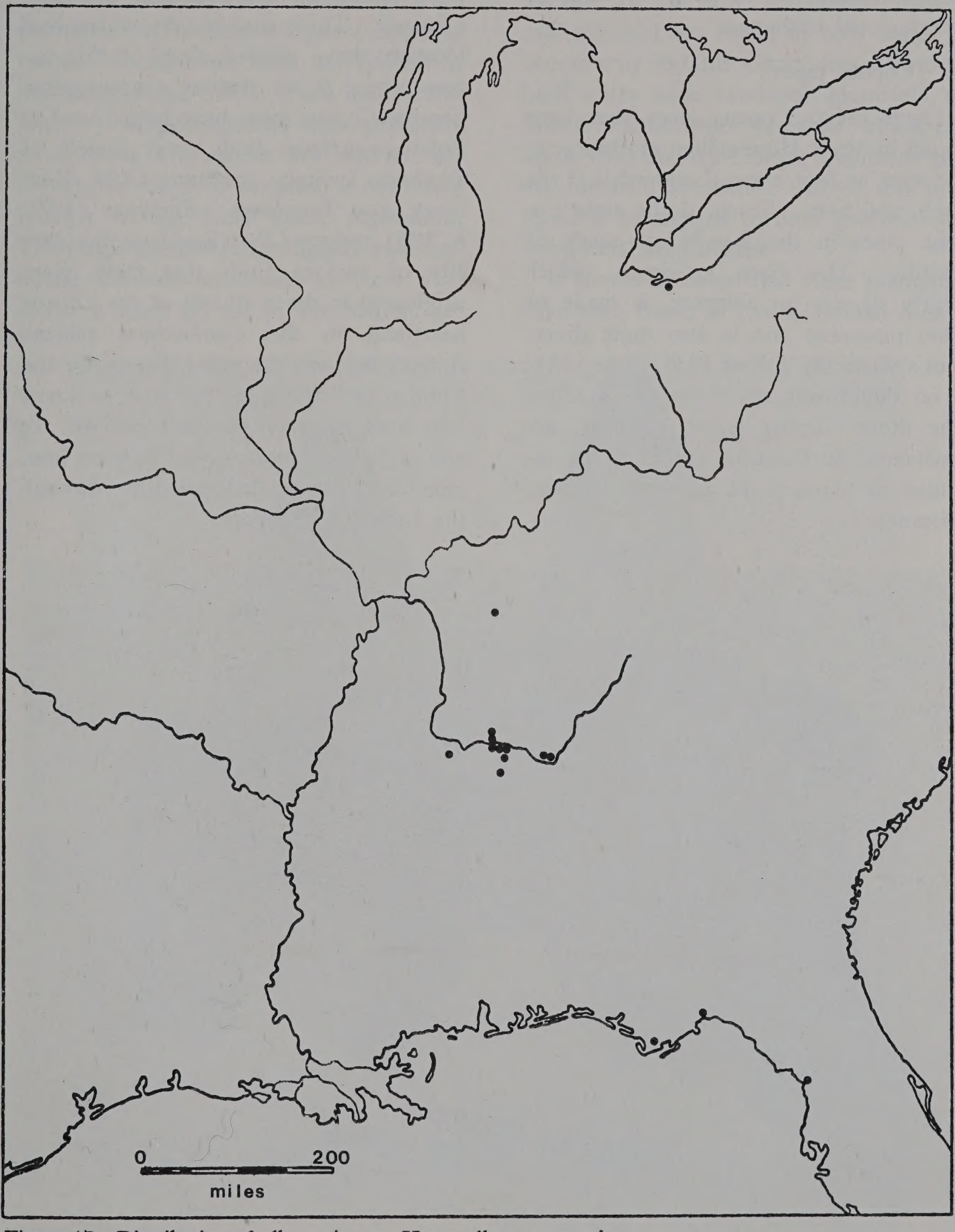

Figure 17. Distribution of elbow pipes at Hopewell mortuary sites

Coast pipes, however, can be shown to be sufficiently distinct to eliminate them from consideration as potential items of interregional exchange.

16. Copena pipes

Large effigy Copena pipes have been found in direct Hopewellian mortuary association at four sites—Lauderdale, Crib, Esch, and Seip. Seven of the eight Copena pipes in the sample are made of steatite. The Esch specimen, which clearly depicts an alligator, is made of Ohio pipestone and is also quite divergent stylistically (West 1934, Plate 133); it no doubt was made locally in Ohio. The other Copena pipes, however, are considered sufficiently similar to be included as artifacts of interregional significance.

It is not possible at this time to determine a specific source area for Copena pipes based on the available mortuary evidence. Three sites in very widespread locations have yielded pipes of this nature; there is no obvious concentration. Steatite Copena pipes have been found as isolated surface finds over much of southern Indiana, southern Ohio, Kentucky, and Tennessee. Faulkner (1971, p. 105) suggests that based on the density of surface finds that these pipes originated to the northeast of the Copena heartland in the Cumberland plateau country between the upper Tennessee and Cumberland drainages, an area we know very little about on this time horizon. In any case, these pipes appear to have been circulating, albeit infrequently, through the Interaction Sphere.

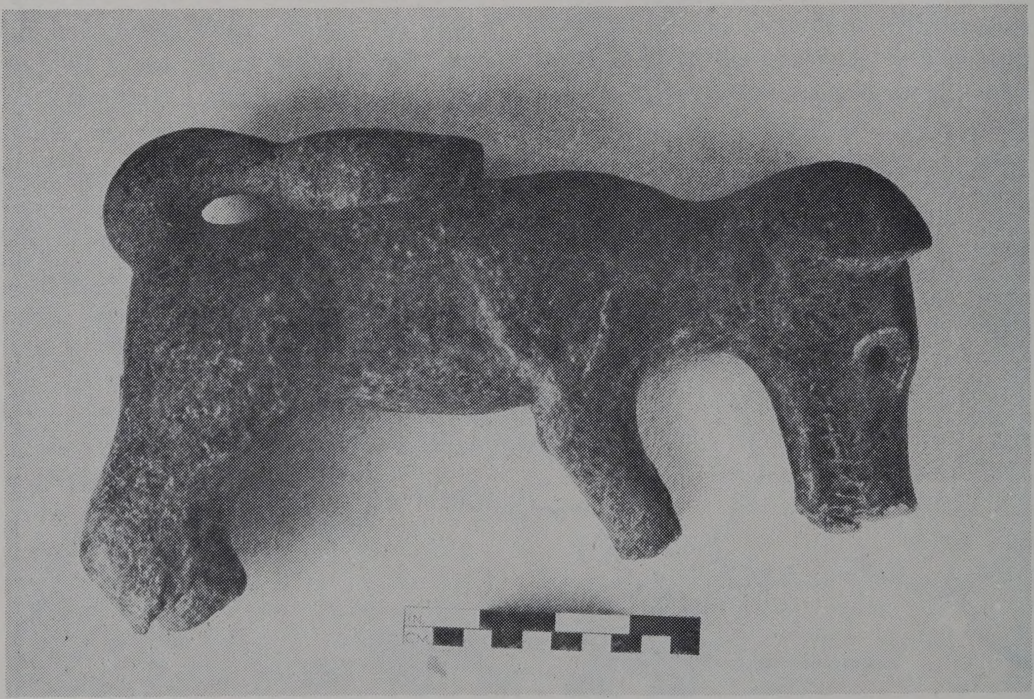

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PLATE XVI. Copena pipe

17. Plummets

Eleven sites have produced grooved plummets of Interaction Sphere raw materials. In all cases these are limited to the Santa Rosa–Swift Creek and Scioto areas. Morphologically, the plummets from these two areas are similar, although the range of variation is definitely broader in the Gulf Coast population. The range of Interaction Sphere raw materials utilized for these artifacts also shows a high degree of correlation between areas; marine shell, copper, crystal, and hematite were used in both areas. Steatite is the only Interaction Sphere raw material not found in both areas; it occurs only in Gulf Coast sites. Sites in both areas have produced plummets of indeterminant types of stone which co-occur with the more exotic specimens and are identical in shape. All of this material is considered to have potential interregional significance.

It should be noted that stone plummets have been found at five additional sites—

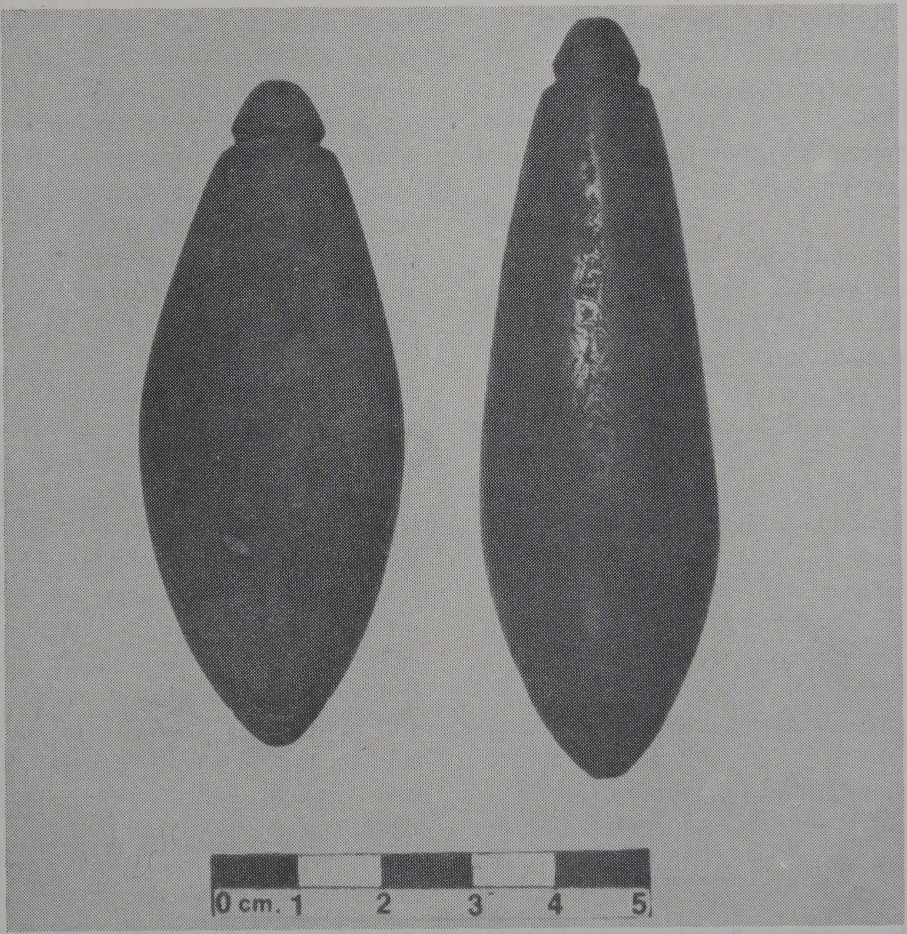

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PLATE XVII. Plummets

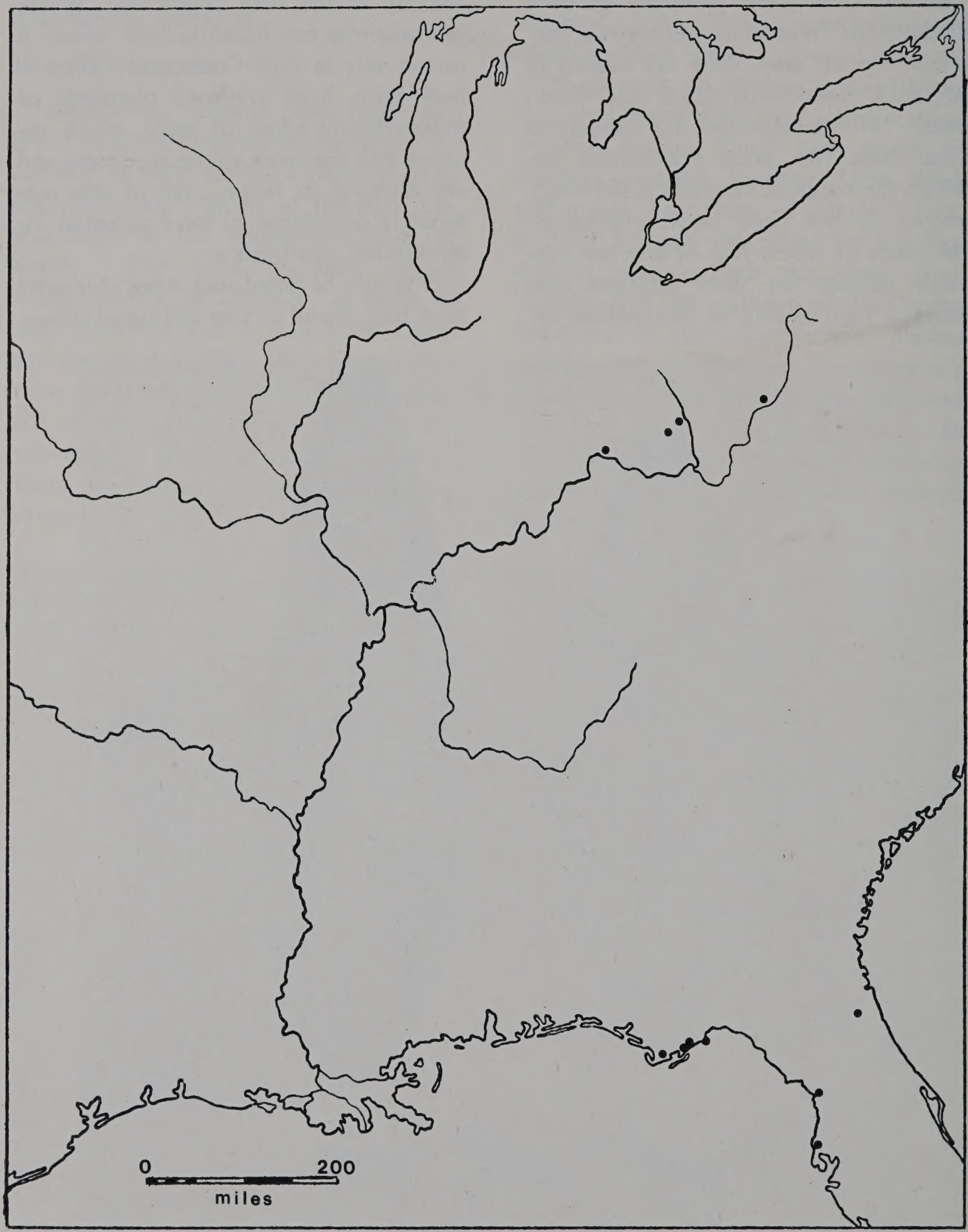

Figure 18. Distribution of plummets at Hopewell mortuary sites

Pierce, Huckleberry Landing, Spring Creek, Cedar Key, and Havana—but are not included in this analysis. Plummets from the four Gulf Coast sites are not illustrated by Moore, hence cannot at this time be demonstrated to resemble their "exotic" counterparts in the area. The single limestone specimen from the Havana site is similar to the plummets included in this analysis, and plummets of this material have been reported from other sites (e.g. Crystal River). However, the Havana specimen is distinct morphologically; no other plummets in the sample have their maximum width located as far distally as this particular example. This, together with its relative isolation and the nonexotic nature of the raw material, suggests that this is a local product. The lack of plummets in mortuary sites of the Havana region is surprising, given Struever and Houart's (1972, pp. 64, 70) contention that these were important items of exchange in the area.

The distributional data suggest that sites yielding plummets are found more frequently on the Gulf Coast than in Ohio (Figure 18 and Table 12). This is consistent with the greater range of raw materials and greater stylistic diversity in the area and suggests that most or all of the plummets found in Ohio were manufactured in the Gulf Coast area. The data on the distribution of individual plummets are difficult to quantify for several reasons, but generally support this argument. About three hundred and sixty plummets have been reported from the seven Gulf Coast sites, over three hundred of which were excavated at Crystal River. In contrast, about fifty-five plummets have been reported from Ohio. Forty-three of these came from Seip.

18. Conch shell containers

Conch shell containers were unquestionably of considerable importance in Hopewell interregional transactions. They have been found at eighty-four sites and in all of the major cultural regions (Figure 19). The raw materials are in all cases assumed to have been derived from Gulf Coast sources. As with mica mirrors, the manufacture of conch shell containers required very little modification of the raw materials. As a result, there are few cultural attributes present on a given specimen that allow the detection of stylistic variation across the distribution. All conch shell vessels are included in this analysis as potential interregional trade goods.

The distributional information is consistent with the stylistic and raw material information and would suggest that the Gulf Coast was the major manufacturing area for conch shell containers traded through the Interaction Sphere. Well over half of the Gulf Coast sites have produced these artifacts, a figure considerably in excess of those obtained from other areas (Table 12). It should be noted, however, that these artifacts appear quite frequently at sites in all areas except Marksville and New York, both of which appear to have participated rather marginally in the interregional exchange network.

The distribution of individual conch shell containers again suggests that the Santa Rosa–Swift Creek area produced by far the greatest number of these artifacts, probably in excess of three hundred specimens. Unfortunately, the data

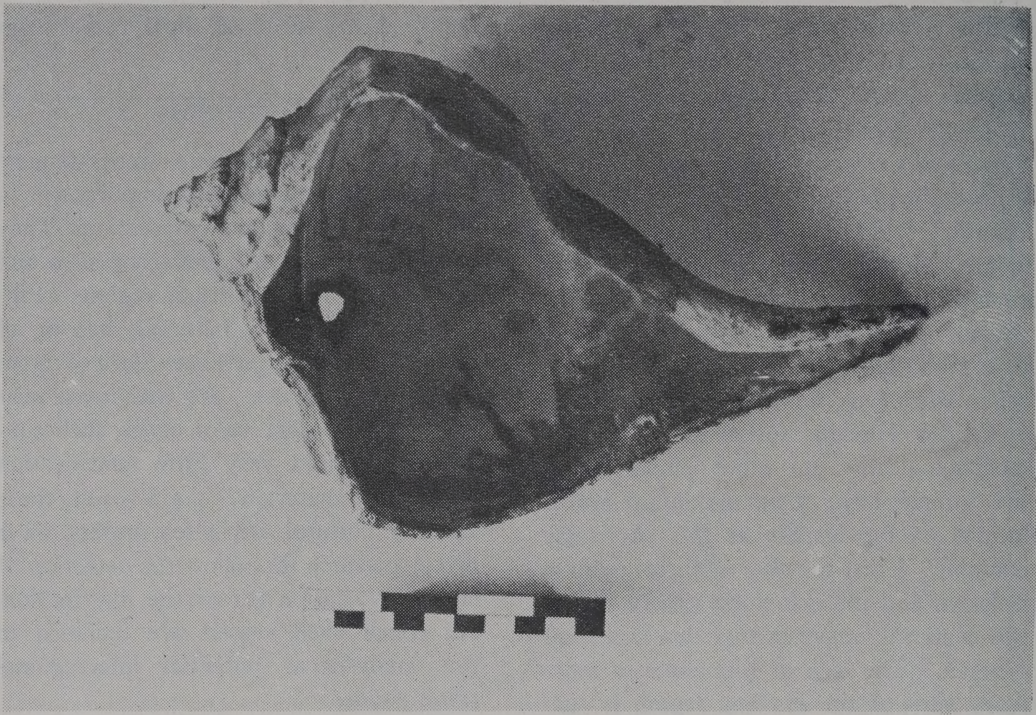

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PLATE XVIII. Conch shell container

from this area are less accurately reported than from other regions. However, the reported estimate contrasts markedly with the number of containers produced by the other areas with reasonably high concentrations. Approximately eighty were recovered from the Havana region, seventy from Ohio, and forty from Copena sites. Within the Gulf Coast area, it is clear that the Crystal River site definitely produced the vast majority of the specimens from the region. Two hundred conch shell dippers is a reasonable estimate for this site on the basis of Moore's somewhat imprecise description of the material (Moore 1903, p. 394; 1907, p. 415). No other site in the region in any way approaches this figure. Murphy Island, for example, probably the second or third most important site in the area, yielded only twenty-two (Moore 1894, p. 509). In any case, it is safe to say that the Santa Rosa–Swift Creek area produced a great many more conch shell containers in mortuary contexts than any other area, which lends additional credence to the argument that this was a major area of conch shell vessel manufacture.

As with many of the artifact classes that are considered typical of Hopewell, conch shell vessels continued to be utilized by succeeding cultural complexes into the historic period. Apparently the Ojibwa were willing to pay the equivalent of thirty to forty dollars in furs for large marine shells (Prufer 1961a, p. 562 quoting Rau 1873).

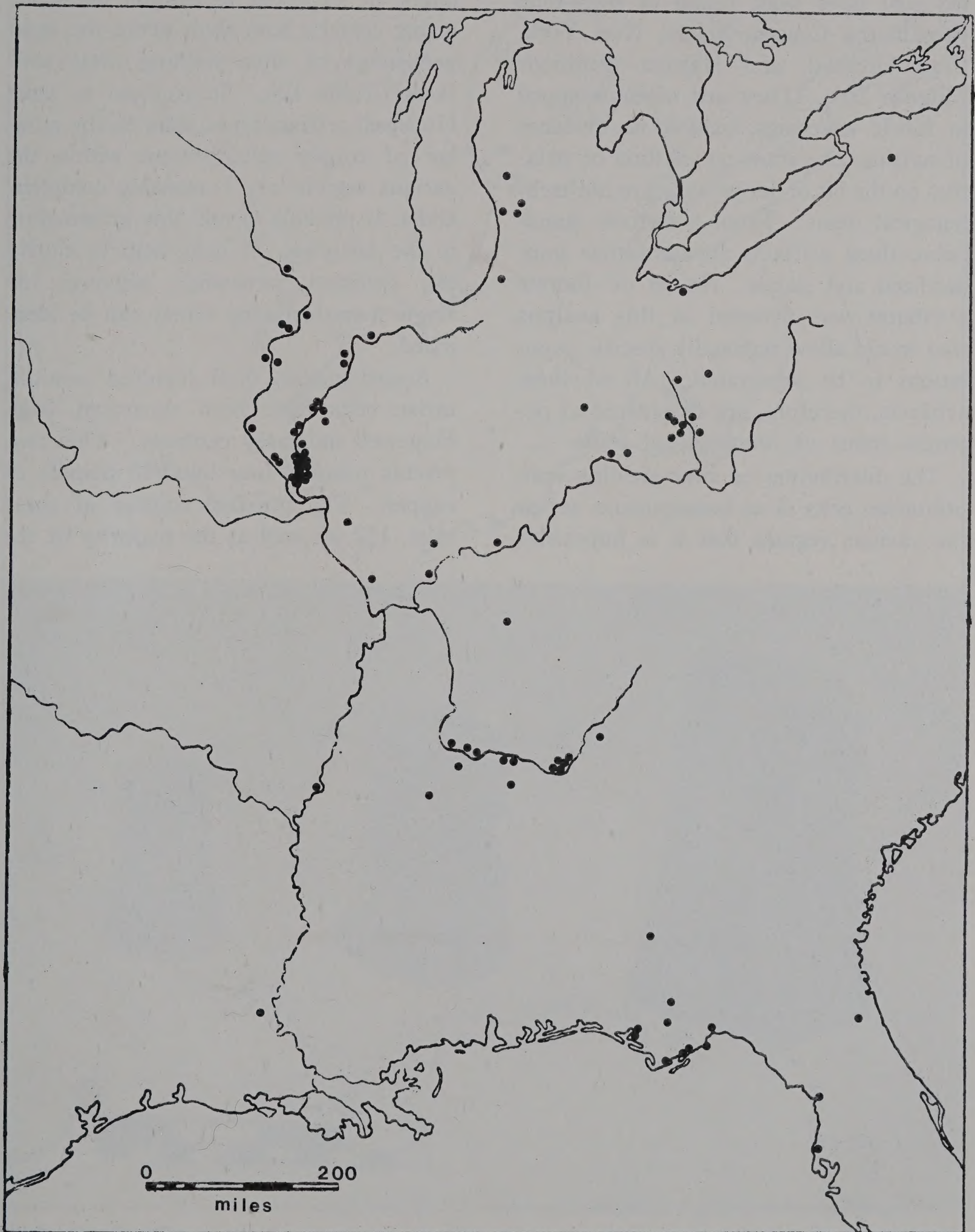

Figure 19. Distribution of conch shell containers at Hopewell mortuary sites

19. Nonutilitarian celts

Celts of copper, meteoric iron, or cannel coal have been found at sixty-nine sites in the Copena, Scioto, New York, Crab Orchard, and Havana traditions (Figure 20). They are often wrapped in fabric coverings, exhibit no evidence of hafting, and show no attrition or striation on the bit or faces; they are not technological items. From a stylistic standpoint, these artifacts appear rather standardized and simple. No set of discrete attributes was detected in this analysis that would allow regionally specific populations to be segregated. All of these artifacts, therefore, are considered as potential items of interregional trade.

The distribution of sites yielding nonutilitarian celts is so homogeneous across the various regions that it is impossible on this basis alone to locate areas of particular concentration. The two areas closest to the copper sources, and which might be expected to contain manufacturing centers, both show about the same percentage of sites yielding these artifacts (Table 12). In contrast to most Hopewell artifact types, data on the number of copper celts present within the various regions are reasonably complete, and it is possible to add this information to the analysis. It does help to clarify the situation somewhat, although no single manufacturing center can be identified.

Approximately three hundred nonutilitarian celts have been excavated from Hopewell mortuary contexts. This represents roughly four hundred pounds of copper. The greatest number of these celts, 152, as well as the majority of the

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PLATE XIX. Nonutilitarian celts

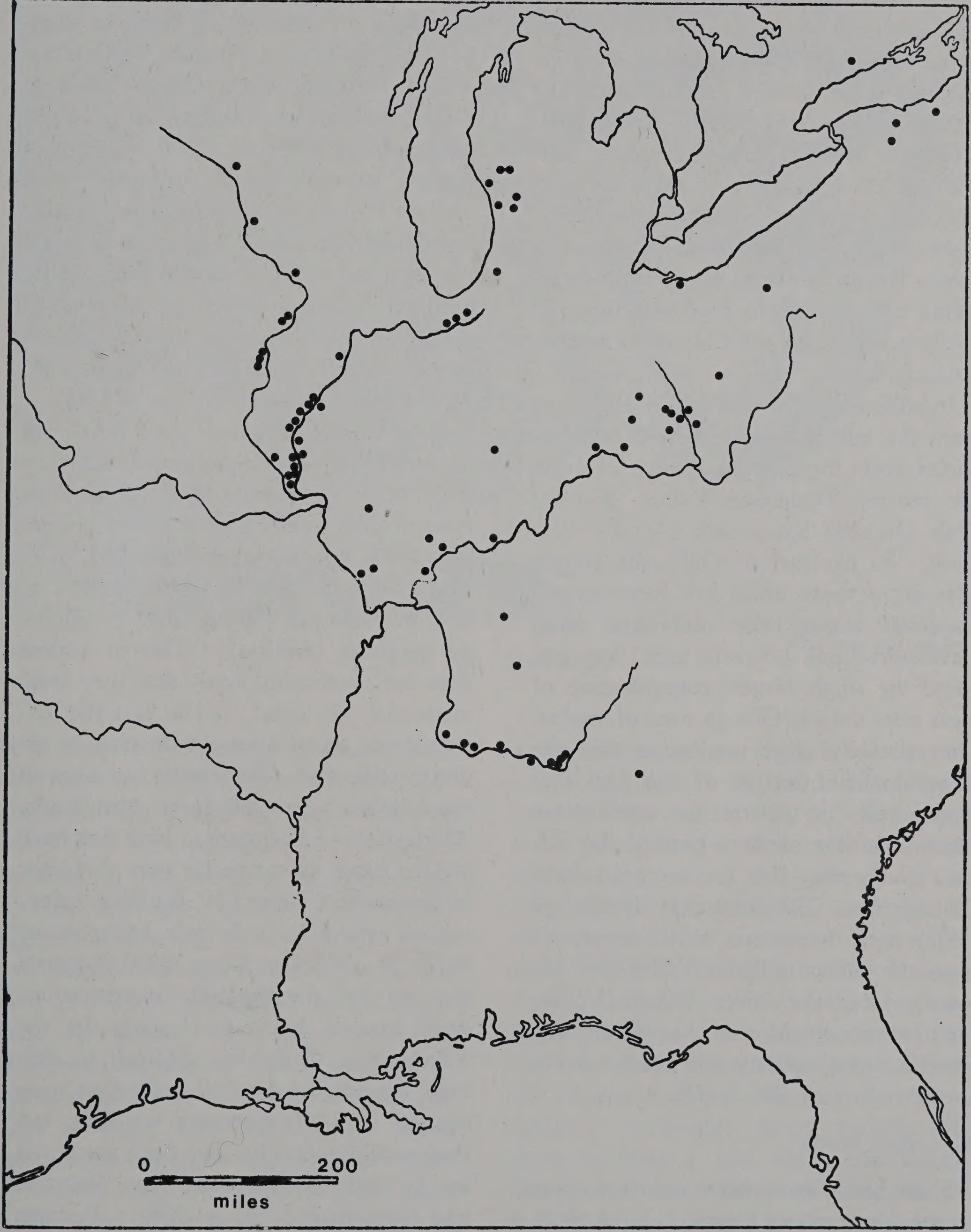

Figure 20. Distribution of nonutilitarian celts at Hopewell mortuary sites

metal devoted to celt manufacture, approximately 240 pounds, was concentrated in Ohio. Much of this activity was localized in the Scioto–Paint Creek area, with Seip and Hopewell far outreaching other sites in productivity. The sixty-six associated copper celts from Hopewell Mound 25, for example, constitute the largest cache of these artifacts in North America. Similarly, the thirty-eight-pound and seventeen-pound celts from Hopewell and the twenty-eight-pound celt from Seip represent three of the largest known pre-Columbian copper artifacts.

In addition to the 152 celts documented from the Scioto area, 123 have been reported from the Havana region, 21 from the central Tennessee Valley, 9 from Crab Orchard sites, and 4 from New York. In contrast to Ohio, the copper celts from these areas are more evenly dispersed among the individual sites. Davenport–Cook (Havana area) has produced the single largest concentration of these celts outside Ohio, a total of twelve. The relatively large number at this site is no doubt reflective of the fact that copper celts in general are much more common in the northern part of the Havana area; sixty-five are recorded from this northern Illinois–upper Mississippi Valley area in contrast to the thirty-six from the central Illinois Valley and the twenty from the lower Illinois Valley. This pattern would seem to indicate that manufacturing activity was greater in the northern part of this region.

20. Shell beads

Shell beads have been reported from seventy-three sites (Figure 21). Any attempt to identify regional bead styles is precluded by the inadequate treatment these artifacts have received in the literature. They are often noted simply as "a string of shell beads" or as "a number of pearl and shell beads." It is assumed, therefore, that all shell beads in the sample can be considered as potential interregional artifacts. This widespread trading of shell beads does gain some support from the ethnohistorical literature, although many authorities suggest that the use of shell money was strictly an East Coast phenomenon prior to its spread to the interior in the seventeenth century (e.g. Beauchamp 1901, p. 338; Driver and Massey 1957, pp. 382-83).

Most of the Hopewell shell beads are of sufficient size to indicate that they were made of marine shell rather than river mussels (see Shetrone and Greenman 1931, pp. 440-41; Fowke 1905, p. 7; Ford 1963, pp. 20, 28; Mills 1922a, p. 275, but also see Perino 1968, p. 20 for an opposing position). This of course does not necessarily imply that they were made near the coast, and in fact the distributional information would seem to indicate otherwise. Relatively few sites in the Southeast have produced shell beads. Although the percentage of sites that have yielded beads is not really very different in the north (Table 12), the little information available on the actual number of beads at particular sites again suggests that by far the greatest concentrations were located here, particularly in the Scioto area. It is very difficult to estimate the number of shell beads that were present in Ohio mortuary contexts, but they would certainly have been measured in the tens of thousands (see Shetrone and Greenman 1931, p. 506). Perhaps five to ten thousand shell beads have

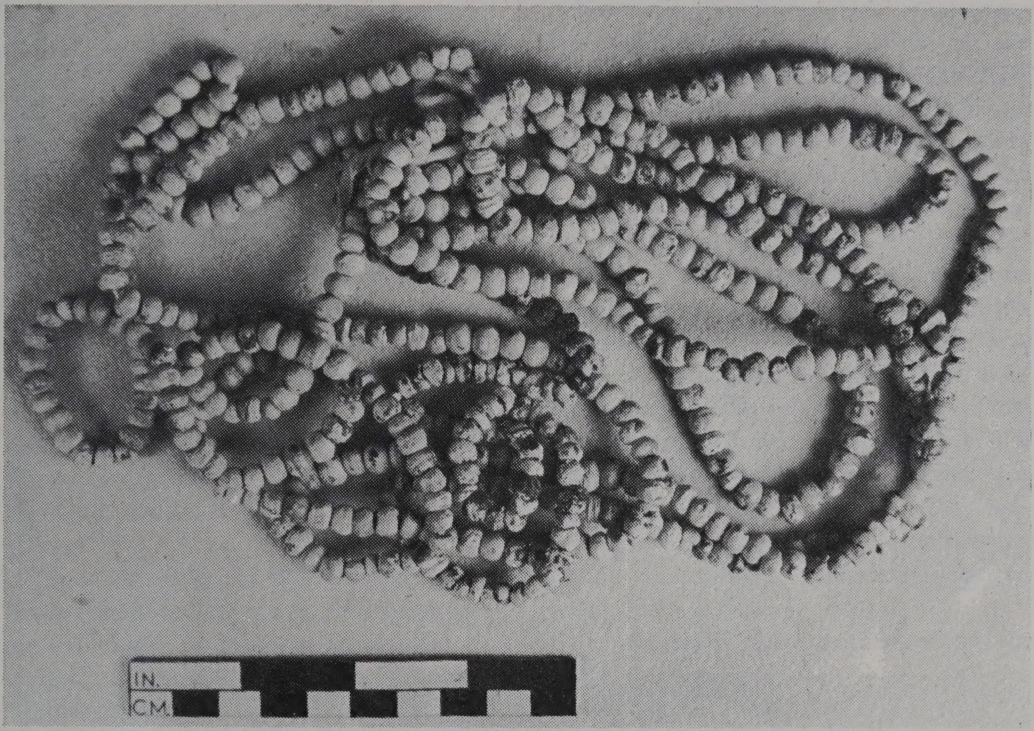

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PLATE XX. Shell beads

been recovered from the Havana area; sites such as Knight, Pete Klunk, Frederick, Havana, Dickison, Baehr, and Albany have each produced in the neighborhood of five hundred to a thousand of these artifacts. In the Crab Orchard region, Rutherford has been the most productive individual site to date, and the area as a whole has yielded several thousand shell beads. References to the Copena material indicate that in contrast to regions farther to the north, none of the sites produced vast quantities of beads nor did the region as a whole yield many. It is quite likely that something less than a thousand shell beads have been recovered from the entire area. Moore's vague references to shell beads in the Gulf Coast area in no case indicate large quantities or caches; "a few" is his favorite modifier for these artifacts, and it does not occur that often. It is quite likely that less than a thousand shell beads were recovered from the entire Gulf Coast region. The Helena Site in the northern Marksville area has produced about a thousand beads. It is the only site in the southwestern part of the Hopewell distribution that has produced a reasonably large quantity of these artifacts, a fact which emphasizes the general resemblance of this site to manifestations farther to the north.

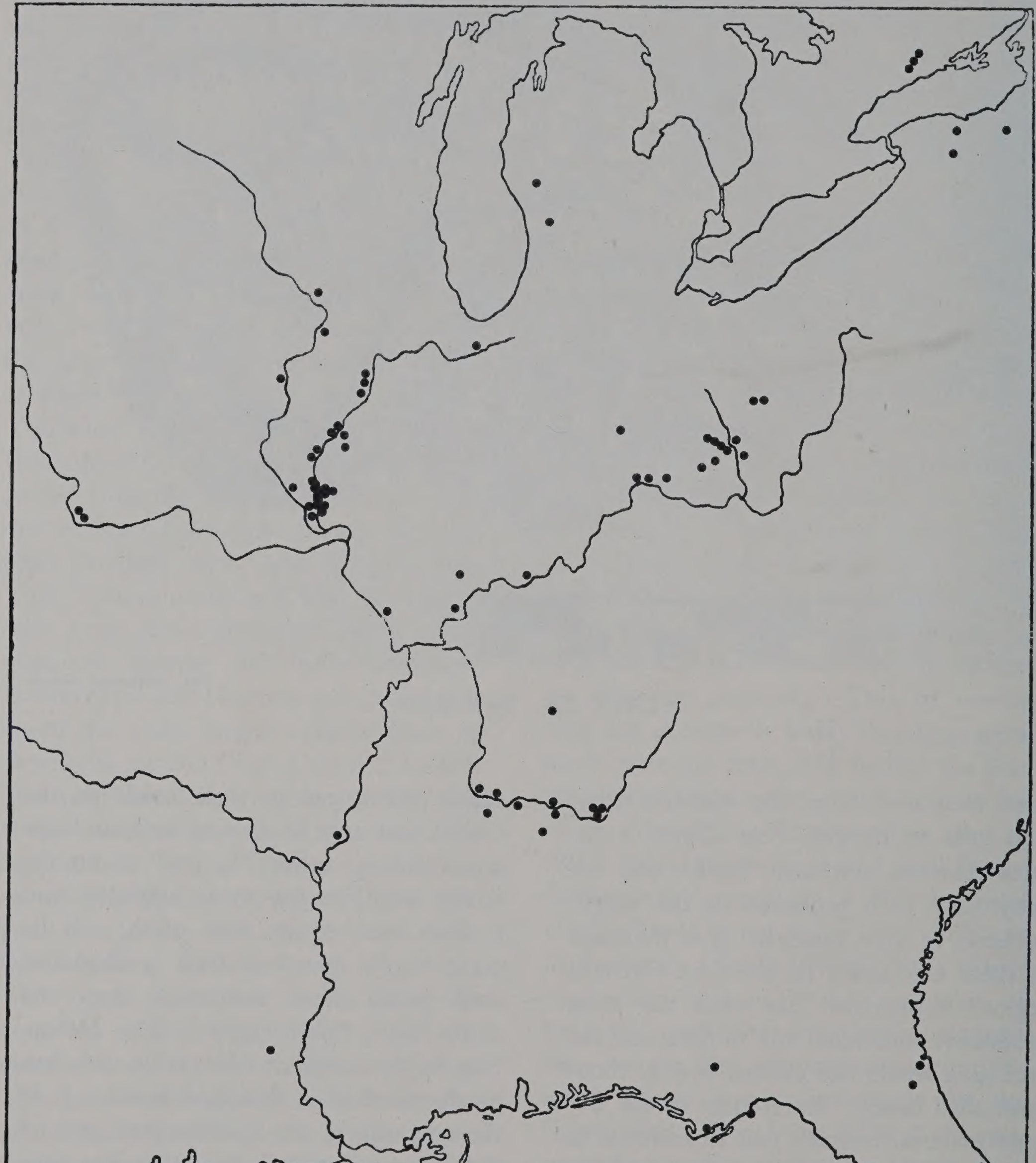

Figure 21. Distribution of shell beads at Hopewell mortuary sites

21. Pearl beads

Pearl beads have been found at fifty-one sites. The shapes of these beads are often irregular due primarily to the natural configuration of the pearl itself. The only modification necessary was the perforation used for suspension, which, according to the ethnographic records, was accomplished very quickly using a hot copper wire or awl to burn a hole through the pearl (Prufer 1961a, pp. 563-64). Because cultural modification of these items was minimal, the potential for recognizing regional variation is slight. Consequently, all pearl beads are included here as potential Interaction Sphere goods.

The distribution of sites yielding pearl beads clearly indicates that they were primarily limited to northern areas (Figure 22). This is in direct contrast to the ethnohistorical literature which emphasizes the importance of pearl beads in the Southeast rather than farther north (e.g. Black 1967, p. 275; Swanton 1946, p. 488). The percentage of sites producing pearl beads is much greater in the Scioto and Crab Orchard areas than it is in the Havana region (Table 12). According to the historic records on pearl availability, this is not the type of distribution that would be expected; this material was much more common in the Illinois and Mississippi drainages of the Havana area than elsewhere. It could, however, be regarded as support for Struever and Houart's (1972, p. 74) contention that pearls were a major product of the Havana area in exchange relations with Ohio.

A review of the information on the

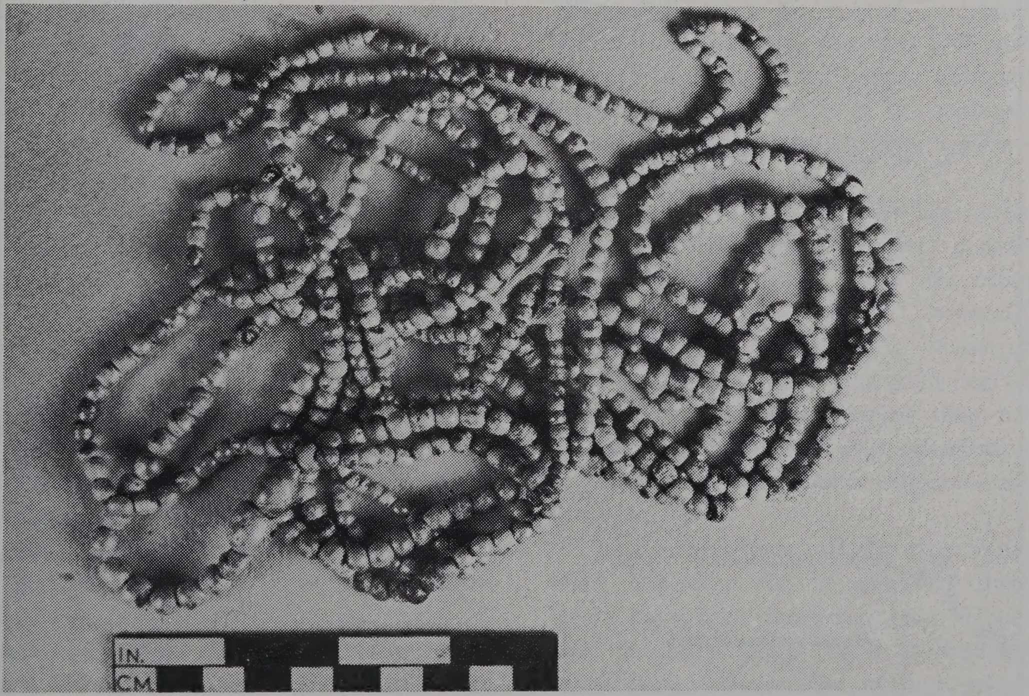

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PLATE XXI. Pearl beads

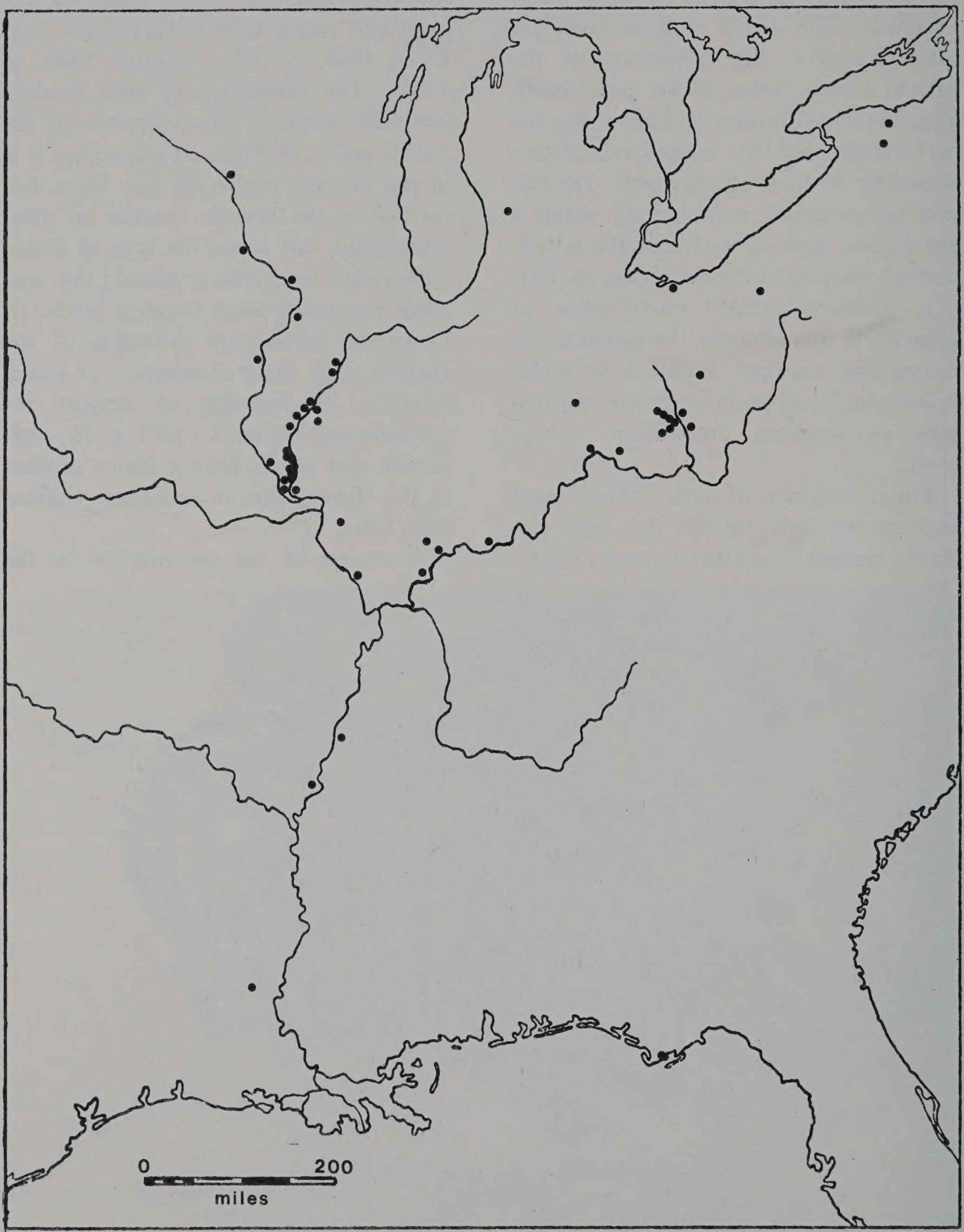

Figure 22. Distribution of pearl beads at Hopewell mortuary sites

actual number of pearl beads present in Hopewell mortuary sites adds little clarity to the situation. The data are too poorly reported. In general terms, it is fair to say that the Crab Orchard area produced considerably less of these artifacts than the Havana region which in turn produced less than Ohio. Somewhat more specifically, it can be estimated that pearl beads excavated from Crab Orchard sites can be measured in the hundreds, those from the Havana region in the thousands, and those from the Scioto area in the hundreds of thousands. It is not possible to progress beyond this level of quantification. Struever and Houart (1972, p. 57) have attempted to do this, but with unfortunate results. They suggest that 3,498 pearl beads have been recovered from the Havana region and 48,587 from Ohio. Both figures are certainly underestimates. For example, they list 16,022 as having come from the Ohio-Little Miami confluence when Metz recovered over 36,000 from a single alter at Turner (Willoughby and Hooton 1922, p. 46). Similarly, they list 32,565 pearl beads as having come from the Scioto-Paint Creek area, while Moorehead (1922, p. 145) reports that he recovered over 100,000 from the Hopewell site. It is impossible to determine how Struever and Houart arrived at their 3,498 figure for the Havana area; but in any case, it cannot possibly reflect the thousands of pearl beads no doubt represented at sites such as Liverpool, Havana, Ogden-Fettie, Dickison, and Toolesboro that were never adequately quantified in the literature for this type of analysis. These authors are probably correct, however, in suggesting that the central Illinois Valley area has produced considerably more pearl beads than either the lower valley or upper Illinois–Mississippi areas.

22. Cold-hammered beads

All cold-hammered metal beads are considered as potential interregional trade goods. Although it may be possible in the future to delineate a number of regionally specific bead styles, it is not attempted in the present study. Thus, all seventy-six sites that have yielded these artifacts are included in this analysis.

Cold-hammered beads have been found in all of the major ceramic regions (Figure 23). These artifacts are found at approximately 30 to 40 per cent of the sites in the four northern areas (Table 12). In the Southeast they are found considerably less frequently except in the Copena area. The exceedingly high percentage of sites in the central Tennessee Valley might indicate that this area was a major manufacturing region, although the extreme distance from the resource zone where copper is available weakens this interpretation.

As Prufer (1961a, p. 408) has noted, cold-hammered beads are poorly quantified in the literature. They are often simply referred to as "a few," "several," "a strand," or "a number." None of these designations conveys a great deal of information. However, rather than not deal with the data at all in a quantitative sense, some very general estimates are provided.

The available data suggest that something less than six thousand of these beads have been recovered from Hopewell mortuary sites. If it is assumed that these beads on the average weigh about a gram, this figure represents only

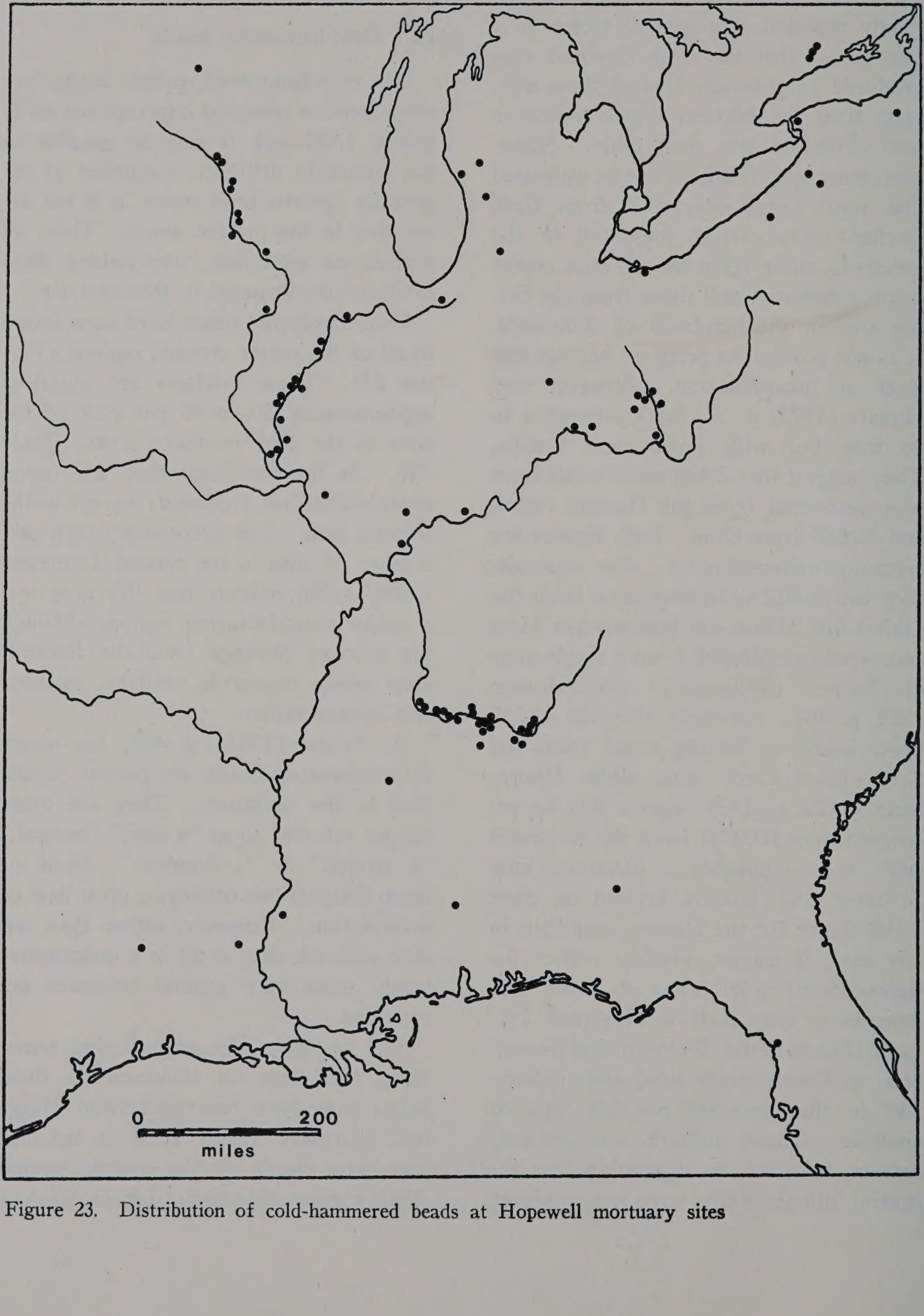

Figure 23. Distribution of cold-hammered beads at Hopewell mortuary sites

about thirteen pounds of copper. Beads from the Scioto area definitely represent a major portion of the total; a reasonable estimate would be in the neighborhood of twenty-five hundred. Turner has yielded about eight hundred of these and appears to represent the single largest concentration in the area. Most of the other major sites for which there is fairly accurate documentation appear to have produced very few. For example, Shetrone and Greenman's work at Seip produced only eight copper beads, and Moorehead's work at Porter produced only one. It is likely that the Havana region produced less than fifteen hundred of these artifacts. The approximately two hundred and sixty cold-hammered metal beads from Norton, the three hundred and thirty from Dickison and the four hundred from Schwert represent the largest concentrations and serve to emphasize the fact that these artifacts were much more common in the central and northern portions of the region than they were to the south. About a thousand of these beads have come from the Copena area of the central Tennessee River Valley. Walthall and Keel's (1974, p. 5) figure of 992 provides some additional support for this figure. The Fisher and Roden sites have both yielded over a hundred of these artifacts and represent the largest concentrations in the region. It is estimated that the New York area has produced about five hundred cold-hammered beads, with the majority of the specimens coming from the northern portion of the range at sites such as Sugar Island (approximately four hundred) and Cameron's Point (seventy-three). None of the southeastern areas that extend into the Mississippi alluvial plain have produced many copper beads; the Marksville area has produced less than one hundred, the Santa Rosa–Swift Creek area less than fifty, and the Miller-Porter area less than five. Thus, it would seem that the Scioto, Havana, and Copena areas have produced the vast majority of Hopewell cold-hammered beads in the sample.

23. Cold-hammered awls

In contrast to most Interaction Sphere artifact types, cold-hammered metal awls quite clearly were technological implements with functions relating directly to fabricating processes. Due to the simple, rodlike morphology it was not possible to segregate any group of awls as regionally distinct. Therefore, all thirty-four known occurrences are included in this study as potentially representing the interregional trade of finished products.

It should be noted that the distribution of metal awls is quite distinctive. They occur predominantly at northern sites, but exhibit no obvious centers of concentration (Figure 24). This is further supported by the fact that awls occur with about the same frequency in the New York, Scioto, Crab Orchard, and Havana areas (Table 12).

Approximately ninety individual awls, representing something less than three pounds of worked metal, have been reported from Hopewell mortuary contexts (mean = 7 grams, n = 8). The vast majority of these, about sixty, have come from the Havana region. Only four have been reported from New York, three from the Crab Orchard region, one each from Santa Rosa–Swift Creek and Copena, and the remainder from the Ohio area. Within the Havana region it is

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PLATE XXII. Cold-hammered awls

clear that most of these artifacts are concentrated at northern sites. Major concentrations occur at the Toolesboro groups, which have yielded a total of thirteen, and at Norton, which has produced at least thirteen. In contrast, only three awls have been found in the southern and central portions of the region, one each from Dickison, Liverpool, and Hacker. In Ohio the greatest concentration as well as the greatest range of raw materials is found at the Hopewell site.

24. Unicymbal ear discs

Twenty-three sites have produced cymbal-shaped ear ornaments (Figure 25). Many of these may simply represent portions of bicymbal earspools, and in fact these types co-occur at nine sites. Unfortunately, at present there is no method of resolving this problem, and all of the unicymbals are viewed as constituting a distinct class of ear ornament. None of these artifacts can be shown to represent regionally specific styles. Consequently, they are all considered as potential interregional trade goods.

The distribution of unicymbal ear discs suggests that if they were Interaction Sphere artifacts, they certainly were not in great demand throughout the system. They occur over a wide area, but so infrequently that their importance as trade goods must have been minimal. The only obvious concentration of sites yielding these artifacts is near the mouth of the Apalachicola River on the Florida Gulf coast. This small cluster of sites to-

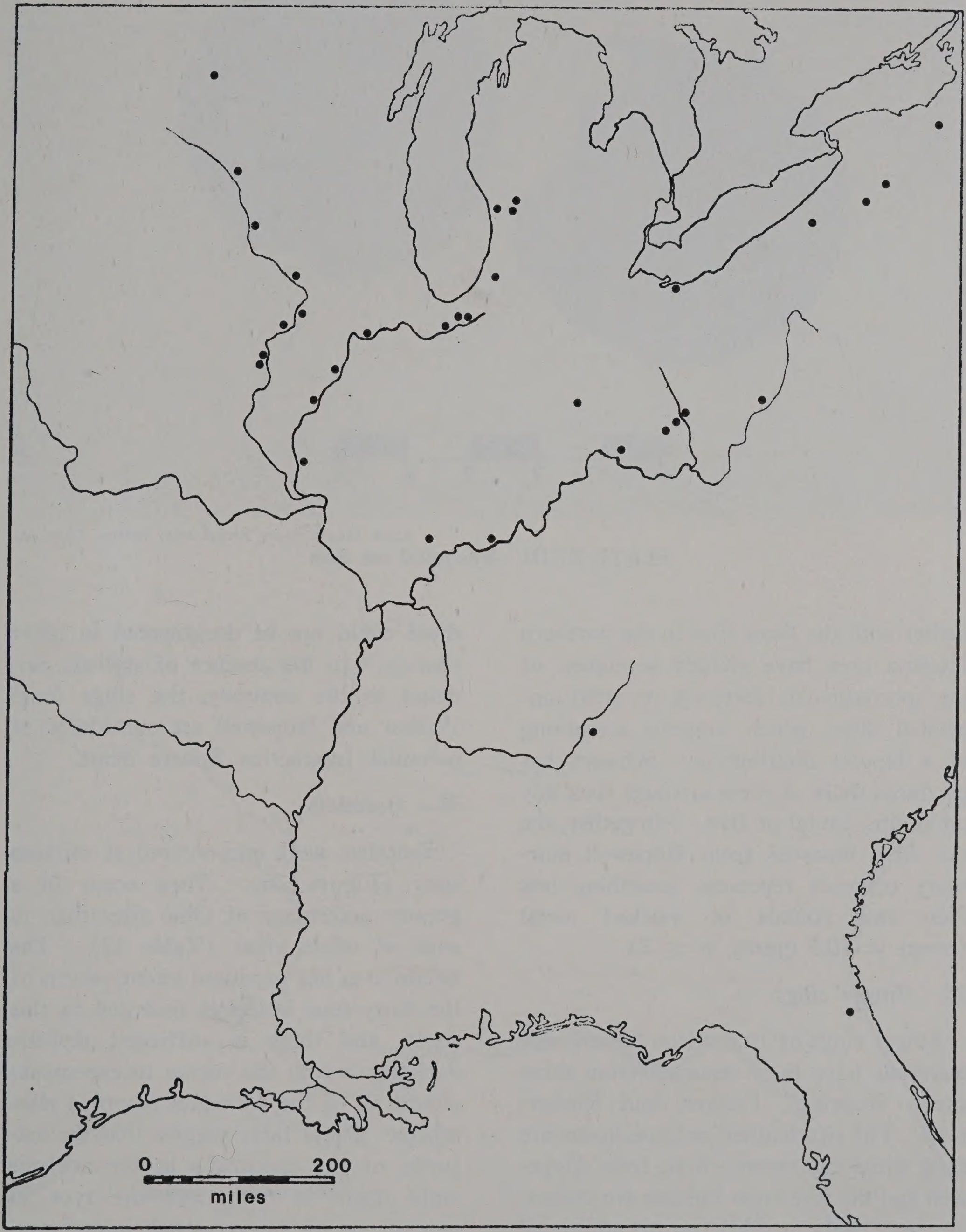

Figure 24. Distribution of cold-hammered awls at Hopewell mortuary sites

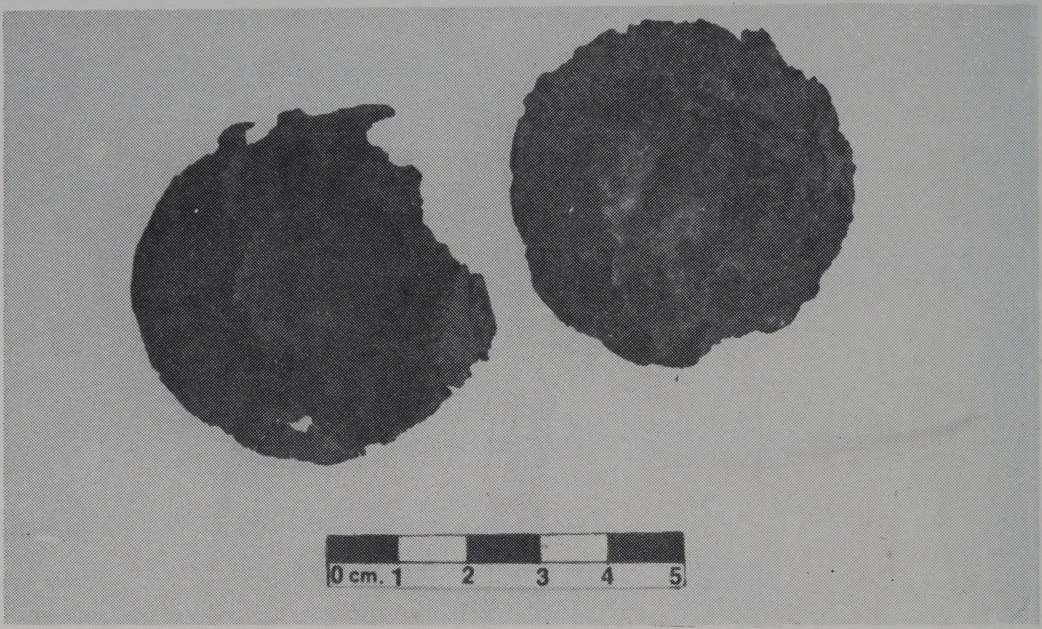

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PLATE XXIII. Unicymbal ear discs

gether with the three sites in the northern Havana area have yielded seventeen of the approximately forty-six reported unicymbal discs, which suggests something of a bipolar distribution. Schwert has produced more of these artifacts than any other site, a total of five. Altogether, the ear discs reported from Hopewell mortuary contexts represent something less than two pounds of worked metal (mean = 10.5 grams, n = 2).

25. Finger rings

Finger rings of Interaction Sphere raw materials have been reported from three sites: Hopewell, Peisker, and Rutherford. The two Rutherford specimens are shell while the twenty-three from Hopewell and the five from Peisker are copper. Prufer (1961a, p. 383) records additional copper finger rings from Turner, but these could not be documented in other sources. In the absence of stylistic evidence to the contrary, the rings from Peisker and Hopewell are considered as potential Interaction Sphere items.

26. Bracelets

Bracelets were encountered at thirteen sites (Figure 26). They occur in a greater percentage of Ohio sites than in sites of other areas (Table 12). The Scioto area has produced twenty-seven of the forty-four bracelets recorded in this study, and there is sufficient stylistic variation within the region to encompass almost all of the examples recorded elsewhere. These facts suggest that the majority of the specimens in the analysis were made in Ohio and the type in general is of interregional importance. An obvious exception, however, is the

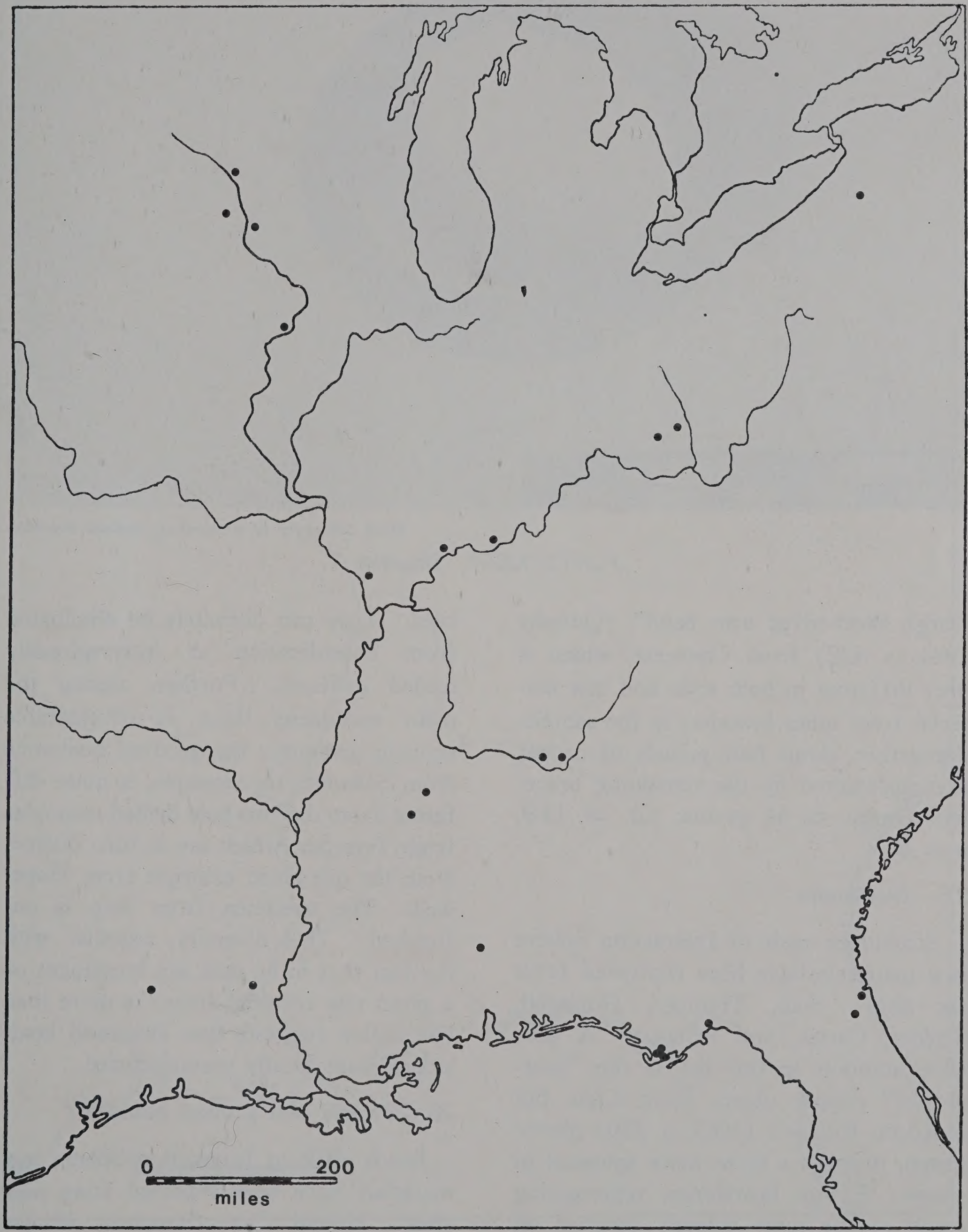

Figure 25. Distribution of unicymbal ear discs at Hopewell mortuary sites

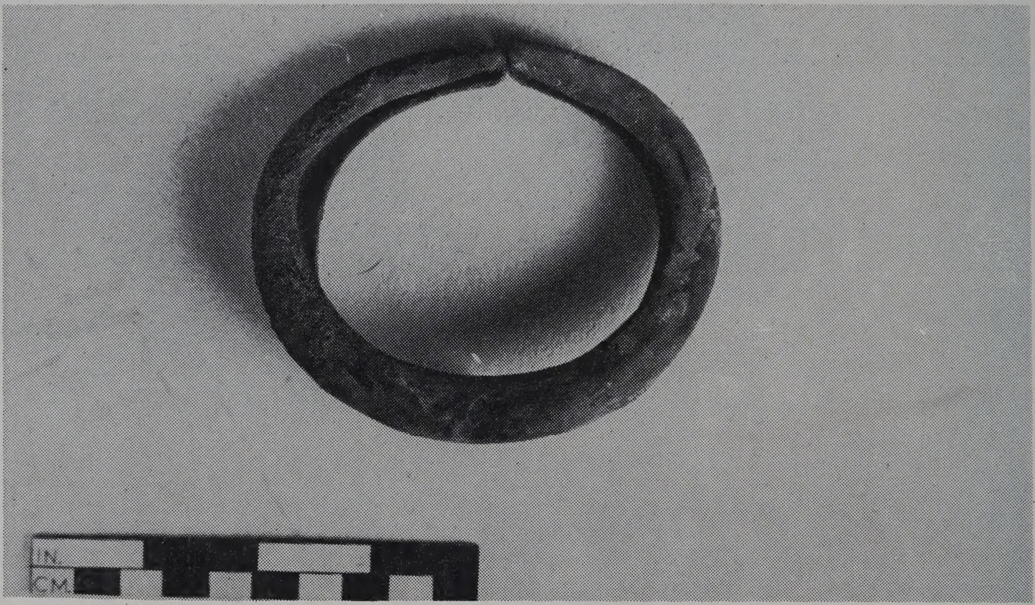

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PLATE XXIV. **Bracelets**

"large sheet-silver arm band" (Quimby 1944, p. 422) from Converse, which is very different in both style and raw material from other bracelets in the sample. Altogether, about four pounds of copper are represented by the remaining bracelets (mean = 44 grams, s.d. = 12.9, n = 6).

27. Boatstones

Boatstones made of Interaction Sphere raw materials have been recovered from six sites: Seip, Tremper, Hopewell, Turner, Carter, and Schwert. A possible addition to this list is the "boat-shaped" copper object from Cain, but based on Ritchie's (1965, p. 220) photograph, it appears to be more spheroid in shape. Effigy boatstones, representing many of the same animals depicted on platform pipes, are found only at Ohio sites. They can definitely be eliminated from consideration as interregionally traded artifacts. Further, among the plain specimens there is considerable stylistic diversity; the grooved boatstone from Schwert, for example, is quite different from the two-hole drilled examples from Tremper, which are in turn distinct from the one-holed example from Hopewell. The specimen from Seip is unfinished. This diversity, together with the fact that in no case are boatstones of a given raw material found in more than one region suggests that Hopewell boatstones were locally manufactured.

28. Pecked and ground beads

Beads made of Interaction Sphere raw materials have been reported from nine sites: Mound City, Campbell, Mingo, Terry and Simms, Robinson, Leeman,

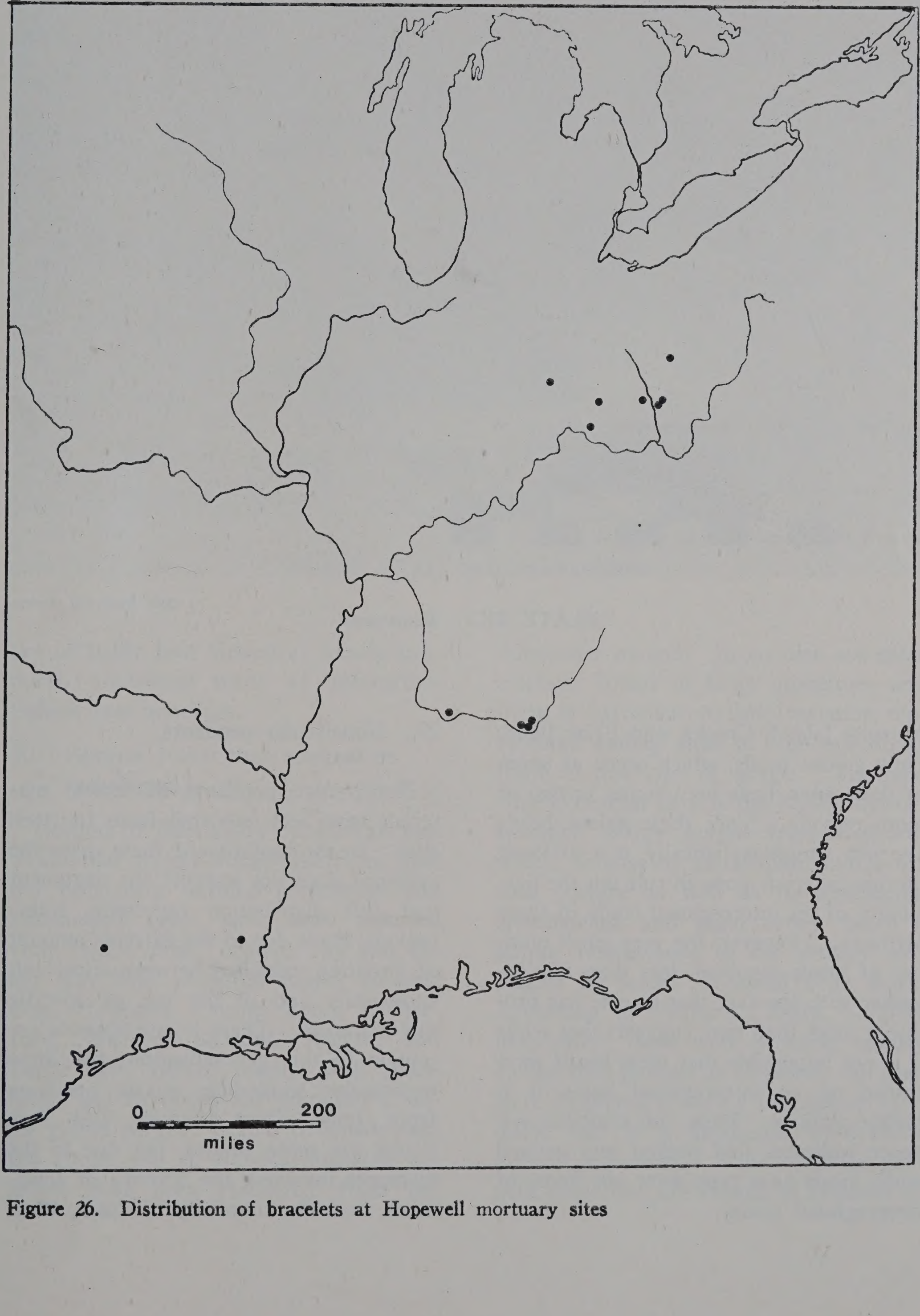

Figure 26. Distribution of bracelets at Hopewell mortuary sites

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PLATE XXV. **Boatstones**

Murphy Island, Crooks, and Briar Bend. Only galena beads, which occur at seven of these sites, have been found in two or more regions. Since these galena beads are very simple stylistically, it is difficult on this criterion alone to rule out the possibility of an interregional trade in these artifacts. However, the very small number of beads involved, less than ten, together with the fact that no site has produced more than two, suggests that while it is not impossible that these beads were traded on an interregional basis, it is highly unlikely. Thus, the available evidence indicates that pecked and ground stone beads as a type were not items of interregional trade.

29. Noncircular pendants

Noncircular pendants of exotic materials have been reported from fourteen sites. In the majority of these cases the evidence does not support the argument that this distribution represents interregional trade due to the extreme amount of variation exhibited between sites both stylistically and in the use of specific raw materials. There is one possible exception to this generalization; the three rectangular single-hole quartz pendants from Jonas Short, Crooks, and Pete Klunk are quite similar, but due to the distances involved, the scarcity of specimens, and the simplicity of form, these

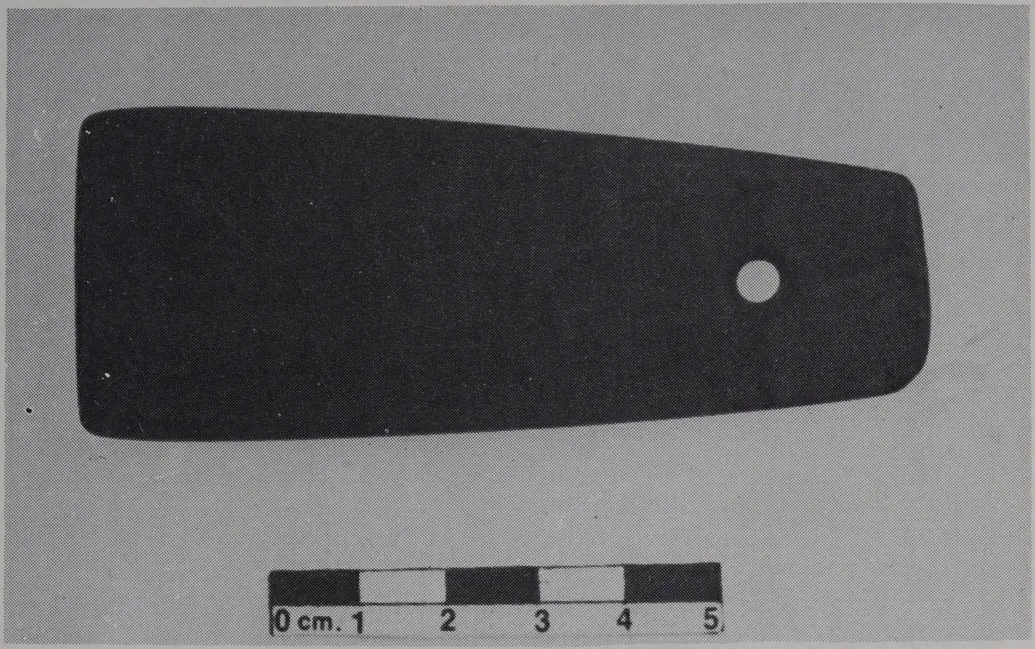

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PLATE XXVI. Noncircular pendants

are probably best viewed as locally produced ornaments made of Interaction Sphere raw materials.

30. Gorgets (other than crescent or reel-shaped)

Gorgets of Interaction Sphere raw materials that are stylistically different than the previously defined crescentric and reel-shaped types have been reported from twelve sites. Mound City and Cedar Key have produced copper gorgets, Seip, Hopewell, Crystal River, Rutherford, Weaver, Bedford, Knight, and Baehr have yielded marine shell specimens, and Robinson has produced a single galena gorget. Both a tri-lobate steatite gorget and an elliptical hematite example have been recovered from the Alexander mound. In no case are these artifacts found in large quantities, and there is sufficient stylistic variation represented among sites to rule out direct trade in this type of gorget. The possible exception here is the highly stylized spoonbill effigy gorget from Bedford, which, because of its complex and recurvate posture as well as its alternating crosshatched and plain zones, bears a strong resemblance to the artistry evidenced in Scioto Hopewell bone work. According to Prufer's (1961a, p. 579) description, there were probably similar etched-shell gorgets at Hopewell, but they were recovered in such a fragmented condition that it is impossible to draw a direct comparison. None of these gorgets, therefore, are viewed as evidence of

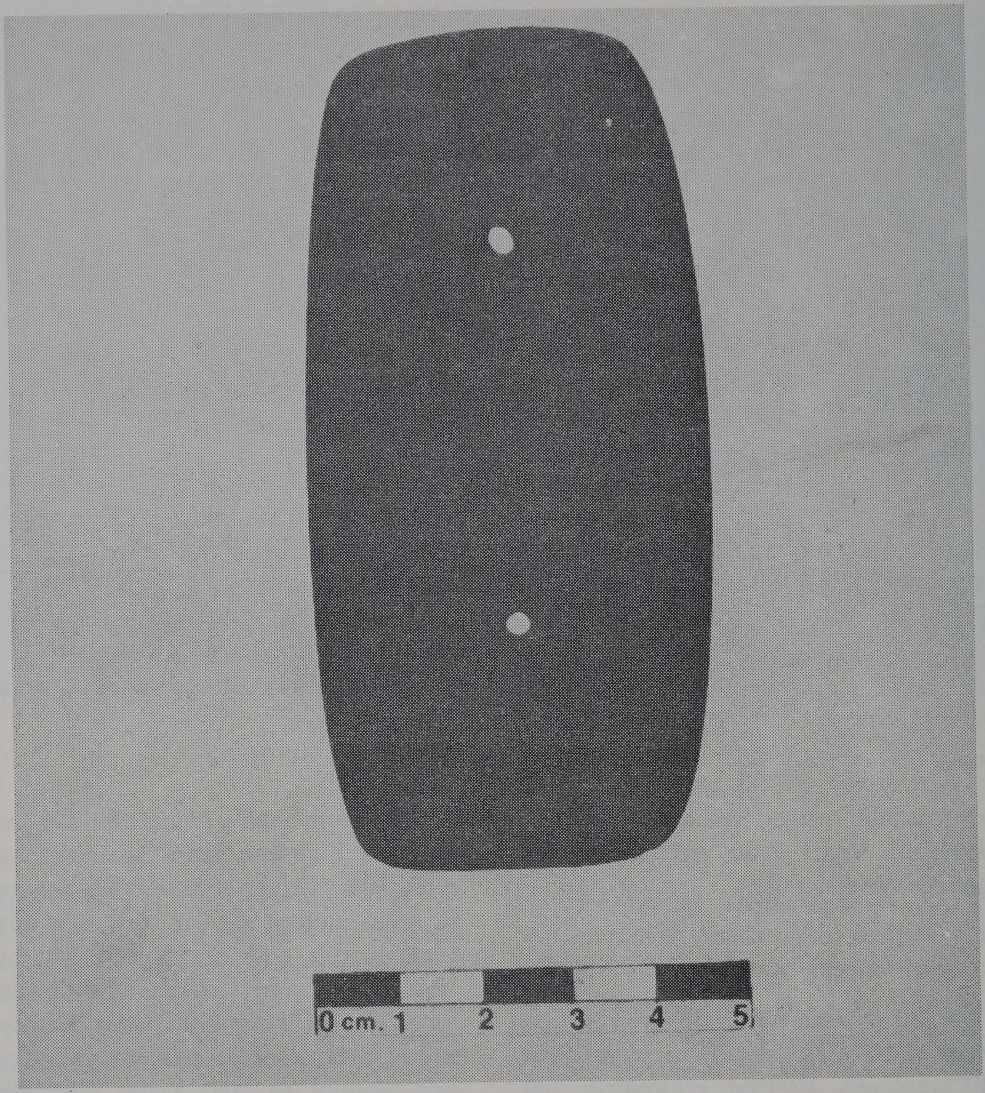

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PLATE XXVII. Slate gorget

interregional trade in finished products.

31. Cones

Cones of Interaction Sphere raw materials occur only at four sites: Seip, Tremper, Hopewell, and Watkins. The hematite cone from Watkins is very similar to some of the quartz specimens from Hopewell and is in fact almost identical to the stone cone from Knight described by Griffin *et al.* (1970, pp. 36-37). It is, however, the only cone of this material, and the only cone known outside of the Scioto area to have been made of Interaction Sphere materials. It would seem, therefore, on the basis of the estab-

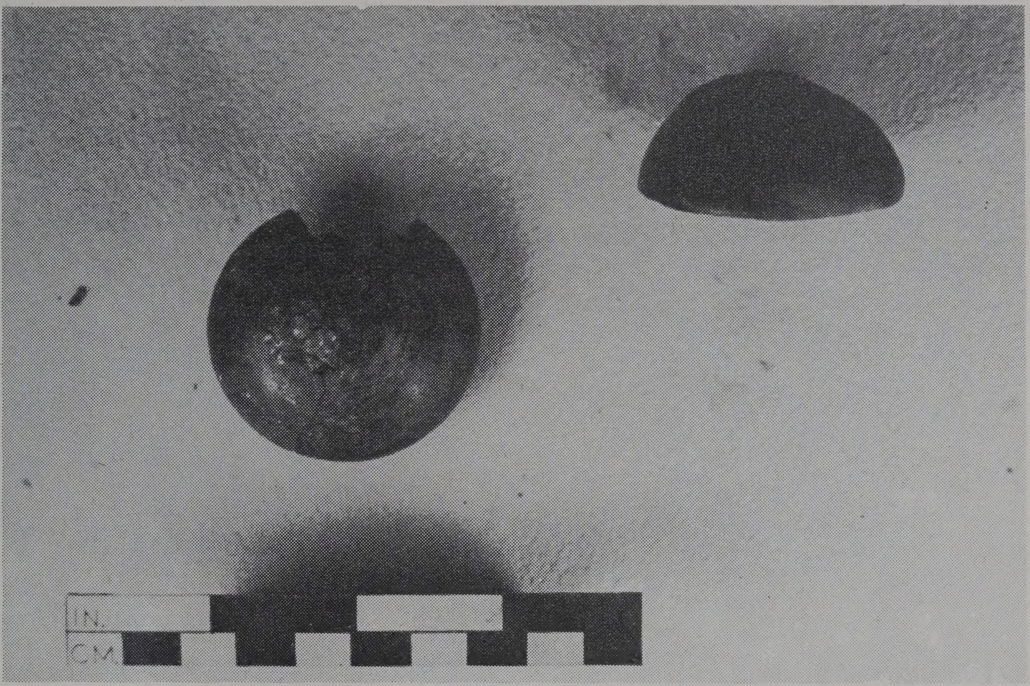

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PLATE XXVIII. Cones

lished criteria that cones cannot be considered as potential trade goods.

32. Snyders points

No Snyders points of Knife River chalcedony or obsidian, the only raw materials considered in this study that are suitable for the manufacture of chipped-stone tools, have been reported from Hopewell mortuary contexts.

33. Projectile points (other)

A number of projectile points made of Knife River chalcedony or obsidian, but that are neither Snyders nor Ross Barbed points, have been recovered from Hopewell mortuary contexts. In the Havana region projectile points of this "type" have been recovered from six sites. Davenport and Naples have both yielded Steuben Stemmed obsidian points, and the Naples Site also produced a large, corner-notched Knife River chalcedony spear with exceptional collateral flaking (see Griffin 1965). Site F°455 in southern Fulton County, Illinois, yielded a square-based obsidian point, and Flucke has produced a large corner-notched spear of obsidian. In Ohio, the Shinkal mound has produced one obsidian projectile point with a Snyders-like blade, but with a stemmed rather than a corner-notched hafting element. Several weakly corner-notched obsidian points with slightly convex bases were recovered at Turner, and Mound City has yielded one small obsidian point resembling the Marshall type and a large corner-notched

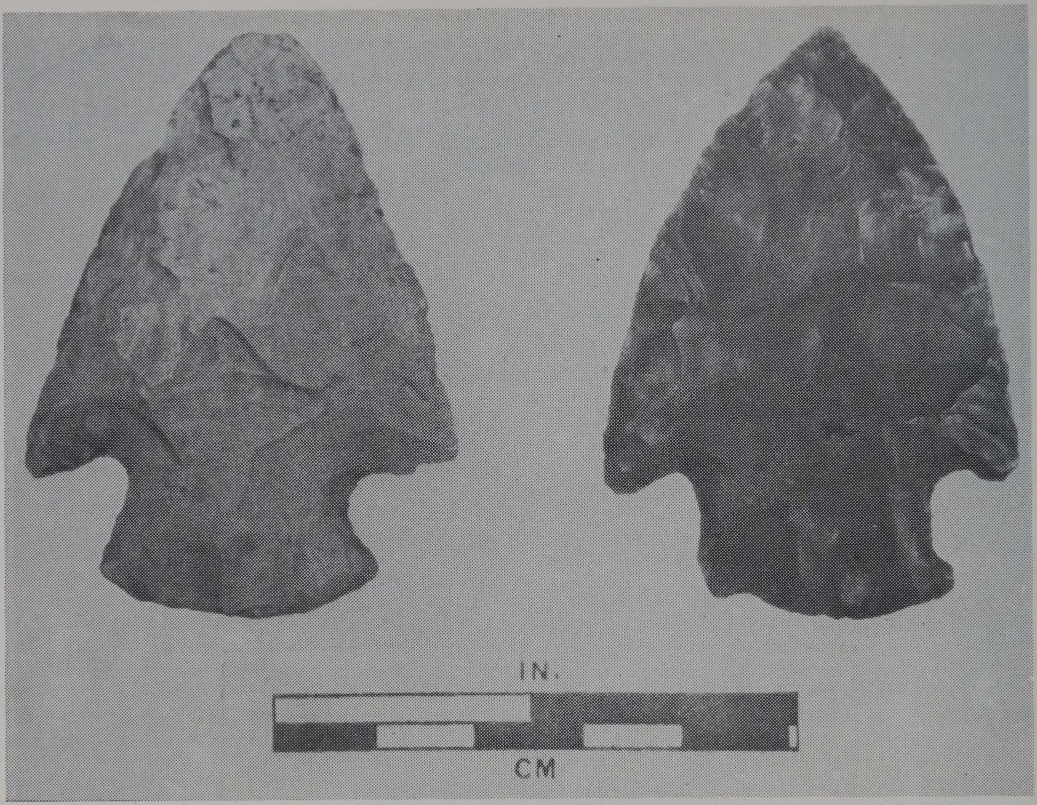

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PLATE XXIX. Snyders points

spear with a straight base (Griffin 1965, pp. 116-17). A recent article by Converse (1975) serves to document further the range of variation evidenced in the obsidian points recovered at the Hopewell Site. Neither of the styles illustrated, however, can be documented from other regions. To expand this point somewhat, none of the particular styles of obsidian or Knife River chalcedony points appear to have an interregional distribution, with the possible exception of the Flucke specimen which is fairly similar to a corner-notched spear from Mound City 13. It is assumed that the various projectile points discussed in this section represent local products rather than interregional trade.

34. Cache blades

Obsidian or Knife River cache blades have been reported from Hopewell, Seip, Sioux Coulee, White, and Naples. Two of the Wisconsin specimens, specifically the blades from White 10 and Sioux Coulee (McKern 1931, Plate LX), are ovate, plano-convex in cross section, and generally less refined than any of the Ohio examples. The two large cache blades from Schwert similarly do not reflect the shape or chipping pattern of the various Ohio specimens. The "laurel-leaf" Knife River blade from Naples, which is exceptionally well made, has no known sylistic counterparts in the Scioto region. These differences suggest that

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PLATE XXX. Cache blades

cache blades were not important items of trade.

35. Bladelets

Only one site, Bedford, has produced bladelets in an unambiguous mortuary context that were made of obsidian. Despite this very limited distribution, it might still be argued that obsidian bladelets were traded to the Havana area from Ohio, where relatively massive quantities of this material have been found. However, it should be pointed out that the presence of wasted obsidian blade cores at sites such as Hopewell, Mann, Montezuma, Hildebrand, and possibly Toolesboro, argues that obsidian bladelet manufacture was definitely taking place in a number of Hopewell regions.

36. Bear canine ornaments

Artifacts made of bear canines have been found at fifty-seven sites. Most of these are within the Havana or Scioto areas (Figure 27). Stylistically, these ornaments exhibit nearly the same range of variation in Ohio and Illinois; both areas have produced split, grooved, polished, drilled, pearl-inlaid, pegged, incised, carved, and cut bear canines (compare with Struever and Houart 1972, Table 2). The only major exception would be some of the elaborately carved and/or drilled examples from the Hopewell Site. Struever and Houart (1972, pp. 48, 72) have argued that bear canine ornaments were important Interaction Sphere artifacts, and on stylistic grounds

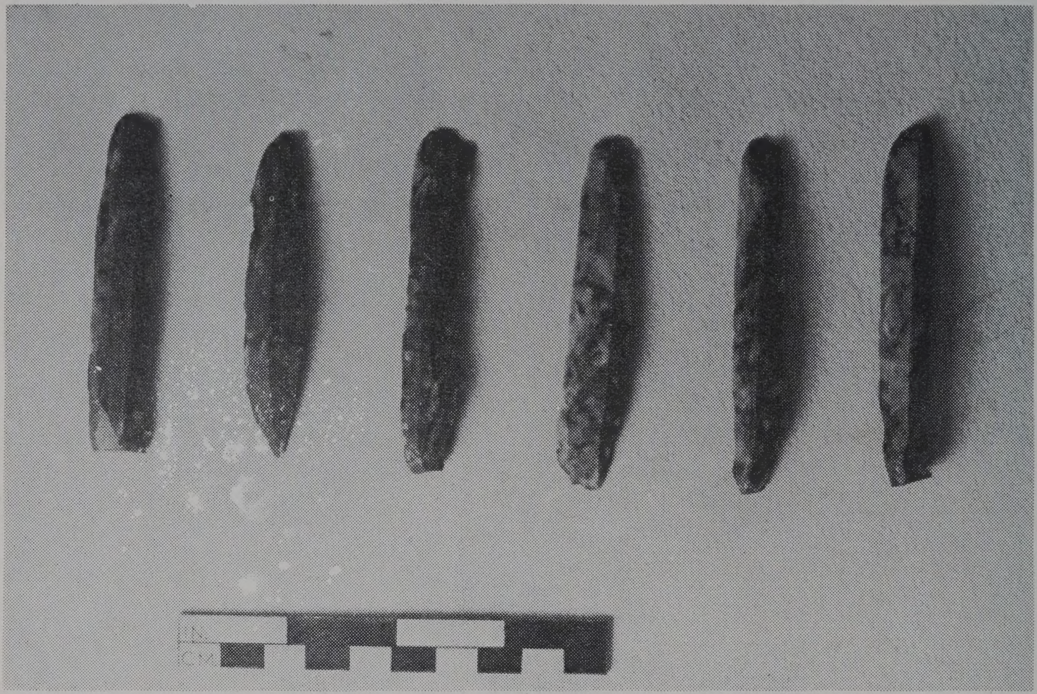

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PLATE XXXI. Bladelets

their hypothesis cannot be refuted.

Bear canine ornaments are decidedly northern in distribution. They are primarily limited to a broad arch of sites stretching from the upper Mississippi Valley in the northwest to the Scioto Valley in the east, and thus span much of the Havana, Crab Orchard, and Scioto areas. The percentage of sites yielding bear canines within each of these areas is quite similar when compared to other regions and really does not help to isolate concentrations that might be indicative of manufacturing loci (Table 12).

Any attempt to deal with bear canine ornaments on a more quantified basis is severely limited by the imprecision with which they are often reported in the literature. Probably over a thousand of these ornaments have been recovered from Hopewell contexts. Struever and Houart's (1972, p. 57) estimate of 574 for the Midwest-Riverine area is definitely too conservative, particularly with respect to the upper Mississippi Valley and Scioto-Paint Creek localities. With regard to the former area, thirty-six specimens can easily be documented from local mortuary sites, and when this is considered in conjunction with the somewhat more vague, but important, references to occurrences at sites such as Portage, Dunleith, and Davenport-Cook, an estimate of over fifty is more reasonable. A somewhat revised estimate for the upper Mississippi Valley, however, would not alter the fact that the central Illinois Valley has definitely produced the largest num-

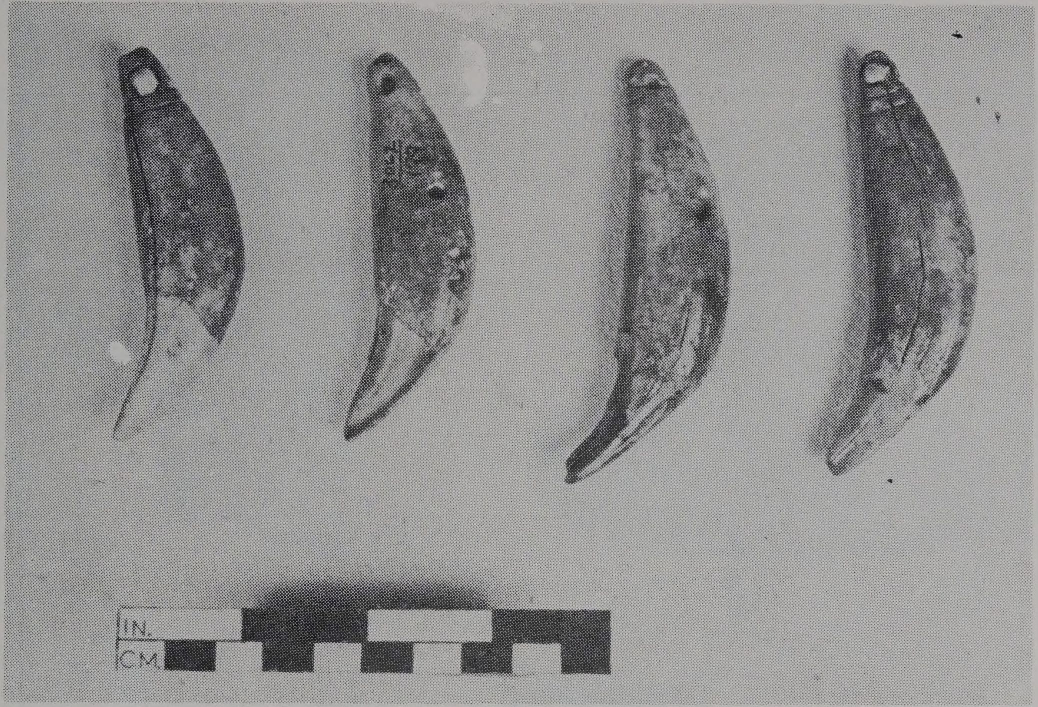

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PLATE XXXII. Bear canine ornaments

ber of bear canine ornaments in the Havana area.

Struever and Houart's estimate of 284 bear canine ornaments recovered from Ohio appears to be derived solely from figures provided by Shetrone and Greenman (1931). This automatically eliminates from consideration a number of important sites that have produced these ornaments that were not included in the Shetrone and Greenman study, notably Ater, Porter, Twin Mounds, and Fort Ancient. It further implies that Shetrone and Greenman's figures are accurate, an assumption that is not justified in all cases, particularly for sites such as Turner and Hopewell (compare, for example, Shetrone and Greenman 1931, p. 506 with Moorehead 1922, pp. 150, 156; see also Prufer 1964, p. 39). At least five hundred bear canine ornaments have been recovered from Scioto Hopewell mortuary contexts with the Hopewell Site yielding the majority of specimens.

37. Figurines

Although they have been reported from a number of habitation sites, figurines have been recovered from only five Hopewell mortuary sites: Turner, Knight, Worthington, Mandeville, and Coral Snake. All except the crystal quartz specimen from Coral Snake, which on stylistic grounds may represent the best evidence for the presence of a direct Mesoamerican import in a Hopewell context, are made of clay. Struever and Houart (1972, pp. 74, 77) have suggested

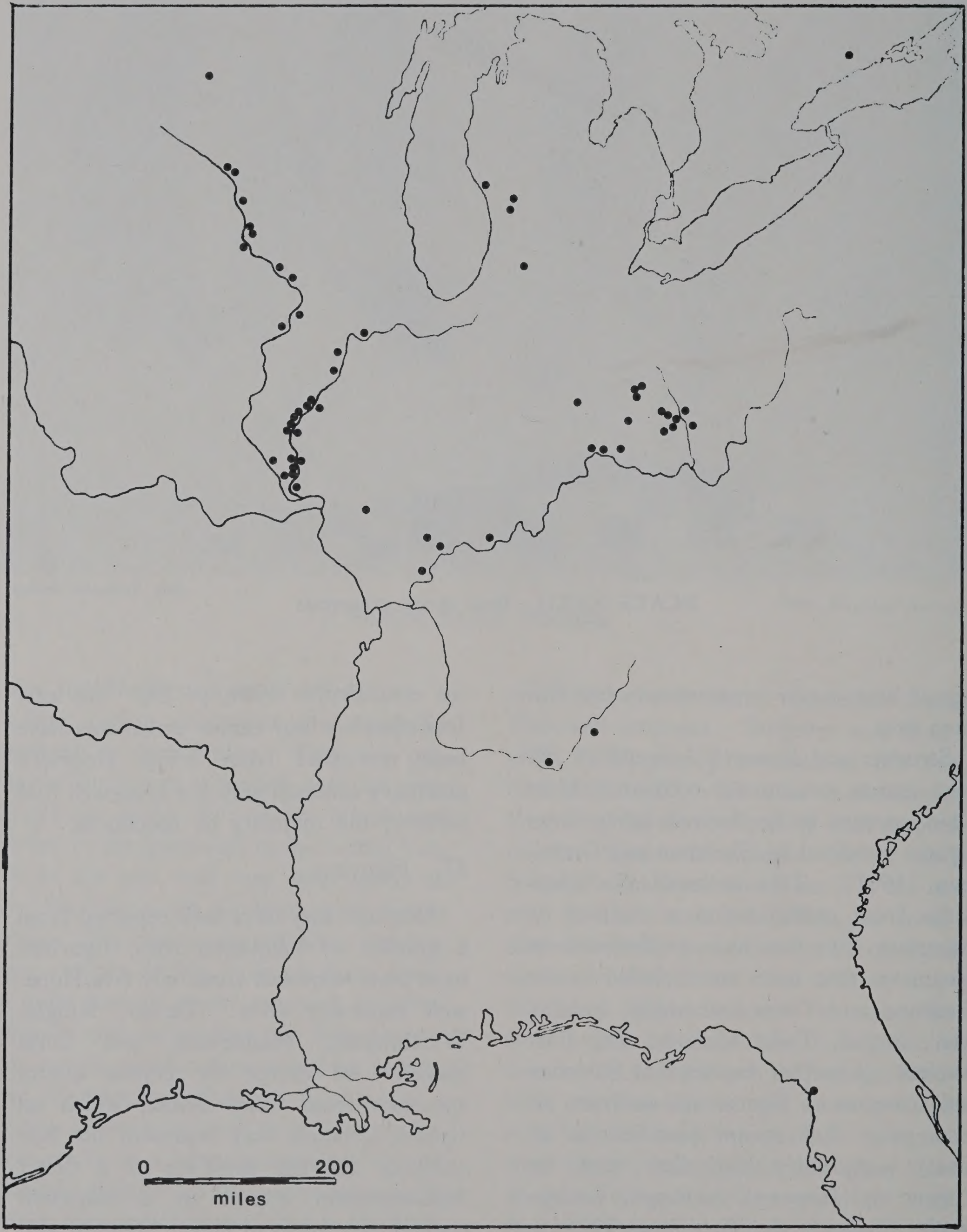

Figure 27. Distribution of bear canine ornaments at Hopewell mortuary sites

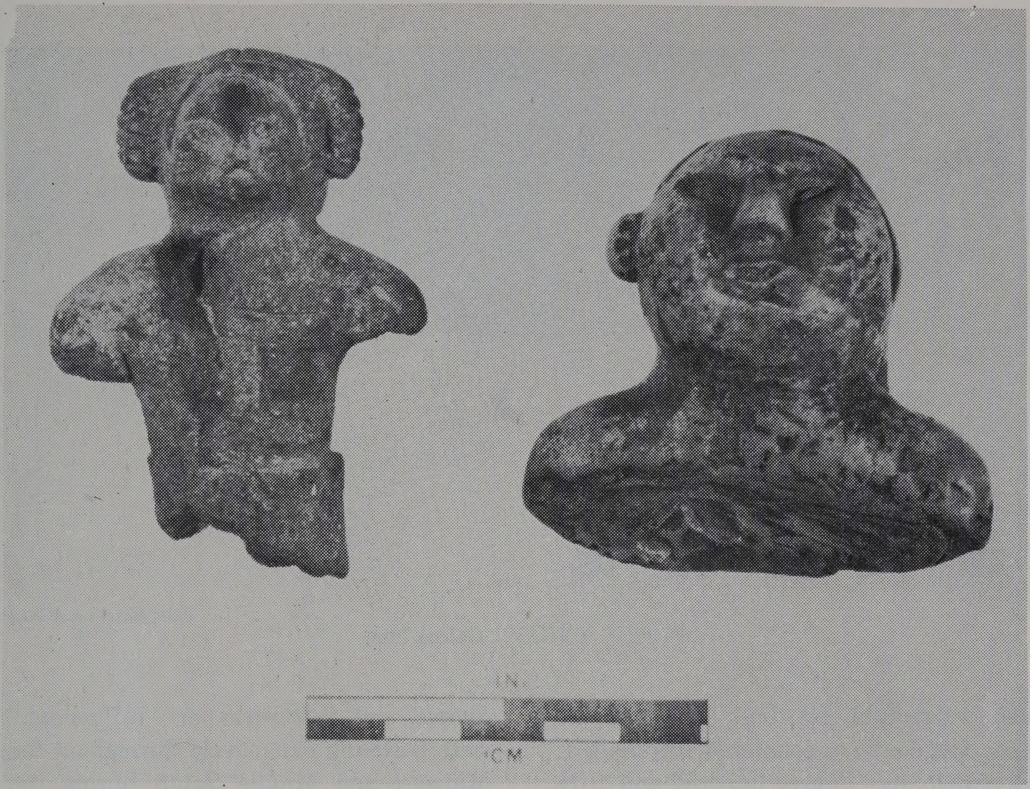

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PLATE XXXIII. Figurines

that figurines were important items of interregional trade and that the majority of them were manufactured at the Mann site. Alternatively, Adams (1949, p. 57) and Griffin *et al.* (1970, p. 87) argue that, although these artifacts share a general morphological similarity, they exhibit sufficient variation among sites to be viewed as locally made products. Certainly with regard to the mortuary sample, the latter position is better supported.

38. Galena lumps

Galena lumps, balls, cubes, piles, and masses occur at sixty-two Hopewell mortuary sites (Figure 28). Despite their various manifestations, and on the basis of context and their limited cultural potential, these "artifacts" appear to have been functionally equivalent. The nature of this function, however, remains to be demonstrated. Most archaeologists assume that galena lumps were used as an ingredient in the manufacture of white paint (e.g. Griffin *et al.* 1970, p. 81). As such, these lumps, cubes, and so forth are probably best considered as raw materials rather than artifacts and need not be given further consideration here. It should perhaps be noted, however, that if this is a correct interpretation then Hopewell peoples were particularly enamored of white paint; in addition to occurring over a considerable area, galena

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PLATE XXXIV. Galena lump

also represents by bulk one of the most frequently encountered materials at Hopewell sites. Three hundred and fifty pounds of galena would be a conservative estimate of the amount reported from Hopewell mortuary contexts. Sites such as Hopewell, Seip, Mound City, Perkins Spring, and Roden have each produced over twenty pounds of this material.

39. Trade ware

In the earlier discussion of the ceramic complexes of each major Hopewell region emphasis was placed on the fact that there are strong stylistic parallels across many of these regions, presumably reflecting a good deal of ideological interchange in ceramic technology. Ideas, of course, do not "flow" from area to area by some kind of osmotic process; they are only adopted within the context of inter-group communication and interaction. People, not just ideas or "influences," were traveling extensively throughout the Midwest and Middle South during the Middle Woodland period. Given this fact, it is not surprising that "exotic" pottery of extraregional origin has been recovered in a variety of Hopewellian areas. Pottery, of course, was at this time an important part of the cultural inventory of all Middle Woodland groups; it is only to be expected that Scioto Valley pottery should occasionally turn up in the southern Appalachians or Havana pottery in Crab Orchard contexts. The important question, however, is to determine if the presence of these sherds or vessels is a relatively passive phenomenon resulting from the presence of nonlocal groups in the area or if the pottery is itself an artifact type central to the exchange system and actively sought by a variety of groups. Is the presence of nonlocal ceramics a function of trade or

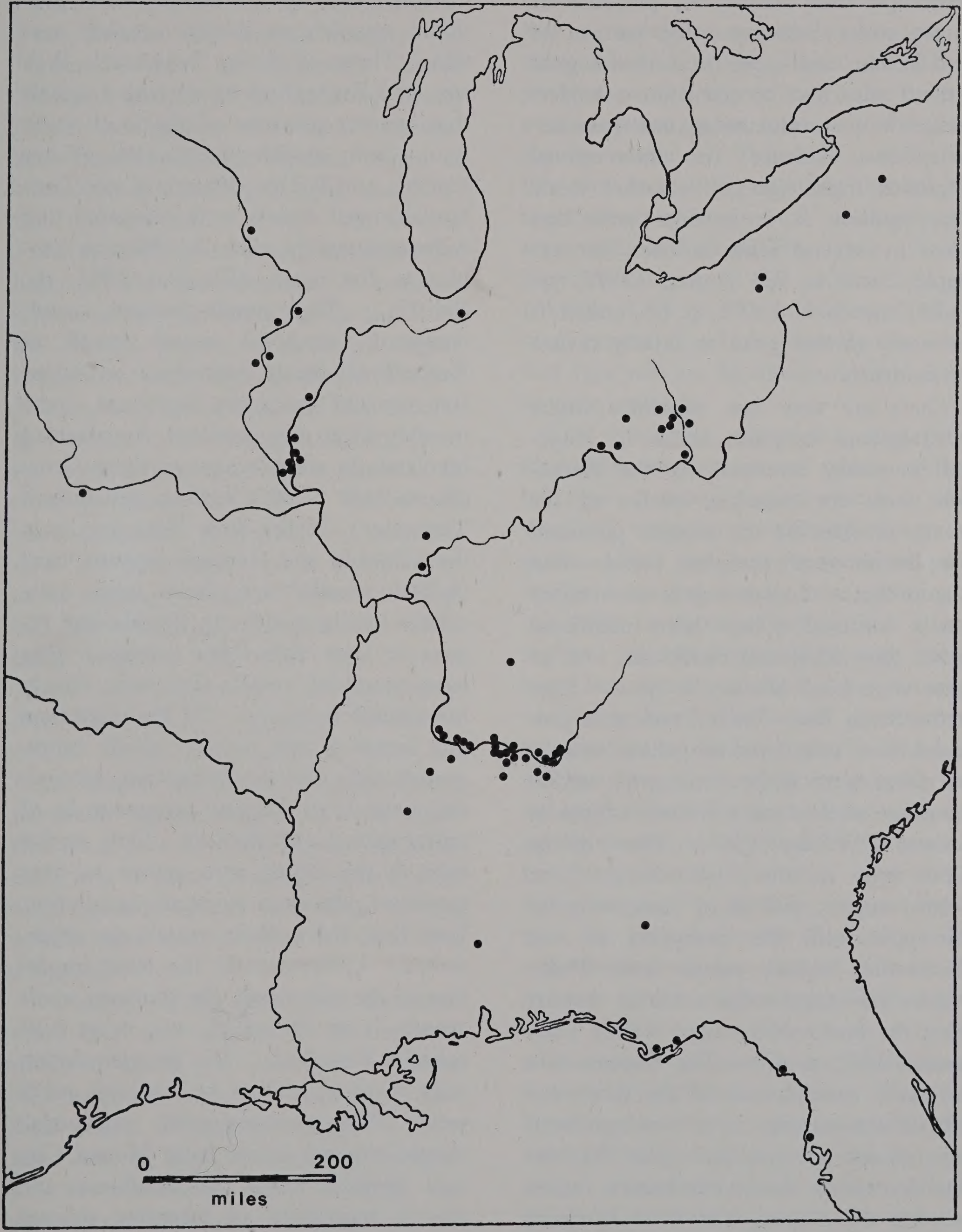

Figure 28. Distribution of galena lumps at Hopewell mortuary sites

simply a by-product of it? To deal with this question requires more specific information than simply the presence of exotic pottery; the quantity, pattern of distribution, and specific archaeological context must also be taken into consideration. When evaluated against these criteria, the evidence for interregional Hopewell trade ware(s) is rather weak. This position is in conflict with that taken by several other authors, for example, Struever and Houart (1972, pp. 74-75) and Keel (1975, p. 6), and it is necessary at this point to briefly review the evidence.

There are very few situations where extraregional ceramics occur in Hopewell mortuary contexts. In the Marksville area, for example, twelve of the seventeen sites in the sample produced complete or nearly complete vessels—that is, pots that with some degree of certainty can be assumed to have been intentional rather than accidental inclusions. All of these were local Marksville types. Sites in the Santa Rosa–Swift Creek area produced over one hundred whole vessels, and these were without exception within the range of the locally produced types as defined by Willey (1949). Three of the eight sites in the Miller-Porter area yielded vessels, and all of these were local types with the exception of one Marksville Incised vessel from Pharr which was apparently a direct import from the lower Mississippi Valley (Bohannon 1972, p. 47). The Copena data are easily summarized; of the thirty-one sites in the sample, none have produced any ceramic associations. The Watkins Site, located in the poorly known region between the Copena and Crab Orchard areas, has produced one tetrapodal, limestone-tempered vessel which is probably a local product. Five of the eight Crab Orchard sites in the sample have produced complete or nearly complete vessels. Three of these, Twenhofel, Wilson, and Rutherford have yielded vessels that are not products of the local tradition. Both at Twenhofel (the Weber mound) and Wilson, Havana Zoned Dentate-Stamped vessels were recovered that were presumably made by Havana peoples to the north (Flanders 1965, pp. 194-95). The simple-stamped, sand-tempered tetrapodal vessel found at Rutherford clearly represents an intrusive element from the Southeast, quite possibly from the southern Appalachian highlands in what is now northern Georgia, western North Carolina, and eastern Tennessee. In the New York area only the Caneada and Geneseo mounds have yielded vessels, and these were quite clearly locally made. In the Havana region at least fifty-three mortuary sites have produced vessels that were clearly intentional inclusions. Of the more than one hundred and twenty vessels represented, only the sand-tempered, tetrapodal vessel from Meppen appears to be of extraregional manufacture. Only twelve sites in the Scioto area appear to have produced pottery in mortuary association. Less than forty whole vessels are represented. Unfortunately the most important of the collections, the fourteen whole vessels from Porter 15, was never adequately described. Of the remainder, only three appear to be nonlocal products. The sand-tempered, tetrapodal, simple-stamped vessel from Mound City was derived from the Southeast and clearly represents an intrusive element into the local tradition. Similarly, the two grit-tempered, zoned rocker-stamped vessels from Esch and Newcastle may represent imports from the Havana area. Both Swartz and Griffin classify the Newcastle pot as Hopewell Zoned Stamped, and there are certainly strong similarities between this vessel and vessels found within the Havana region at sites such as Steuben, Knight, and Norton (Swartz 1971, p. 4). As Prufer (1961a, p. 476) has noted, the Esch pot bears certain characteristics in common with both material from Turner and from the Havana region. Vessels of similar shape have been found at Baehr, Knight, Norton, and Spoonville, and the decoration is not unlike examples known from the northern Havana region, an area in close proximity to Esch. The vessel, which is poorly decorated and certainly quite late temporally, cannot be ruled out as an Havana product. Prufer (1968, p. 52) has also suggested that two additional vessels, the "bird pots" from Mound City, were made some place other than Ohio, and this suggests a Marksville origin. It is clear, however, from the vessel shapes, temper, rim treatment, and particular stylization of the bird motif that these pots were not Marksville products, and in fact fit much more closely with material found elsewhere in the area at sites such as Seip, Harness, and Hopewell.

In sum, it is not possible to document more than ten vessels out of the hundreds of whole pots recovered in Hopewell mortuary contexts that are of nonlocal origin. These ten appear to have been derived from a variety of sources, are not necessarily found at large, important sites, and do not appear to have been accorded special treatment in particular mortuary programs. It is suggested that the incorporation of exotic ceramics into Hopewell mortuary sites was a sporadic, extremely infrequent event which must be viewed as a byproduct of the operation of the Interaction Sphere rather than as a stimulus for its existence. It is not possible at this time to identify anything that might approximate a "trade ware" analogous to types such as Delfina Fine Gray (Pires-Ferreira 1975, pp. 81-82) or Fine Orange (Wright 1974, p. 17) in Hopewell mortuary contexts, and consequently this artifact type will not be incorporated in subsequent analysis.

The discussion above has concerned identifying artifact classes which exhibit the type of morphological variation that would be expected in interregional trade goods. This has been approached primarily from the standpoint of eliminating styles or types with less than interregional distributions. Although these types have been evaluated largely from a qualitative standpoint, some quantitative information is provided as well. The latter has been used wherever possible to aid in the identification of areas of particular concentration which might in turn be interpreted as probable centers of manufacture. Its primary purpose, however, has been to provide the reader with some feeling for the amount of material involved in interregional trade. Twenty-seven artifact types have been defined which appear to have some significance in interregional trade relations. This list is not necessarily in agreement with the data or interpretations provided by previous researchers, and these various points of contrast have been identified.

The number of Hopewell sites that

have produced particular artifact types together with the number of regional traditions in which they occur is listed in Table 13. It is suggested that this information can be used to gain some insight into the relative importance of these types within the Interaction Sphere. (Note: a similar line of reasoning was used earlier in the discussion of the relative importance of certain raw materials within the Interaction Sphere. See above, pp. 303-305). A scattergram of these data reveals several trends (see Figure 29). For example, there is a generally linear relationship between the range and density of Interaction Sphere artifact ($R^2 = .67$). Another particularly important pattern is that classes with high values on both axes can be relatively easily segregated from those with low values. It is suggested that a dichotomization between important and nonimportant artifact classes can be made relatively easily. Twelve of the twenty-seven classes make up the former category, including mica mirrors, conch shell vessels, cold-hammered beads, bicymbal earspools, shell beads, pearl beads, panpipes, nonutilitarian celts, platform pipes, cold-hammered awls, and unicymbal earspools.

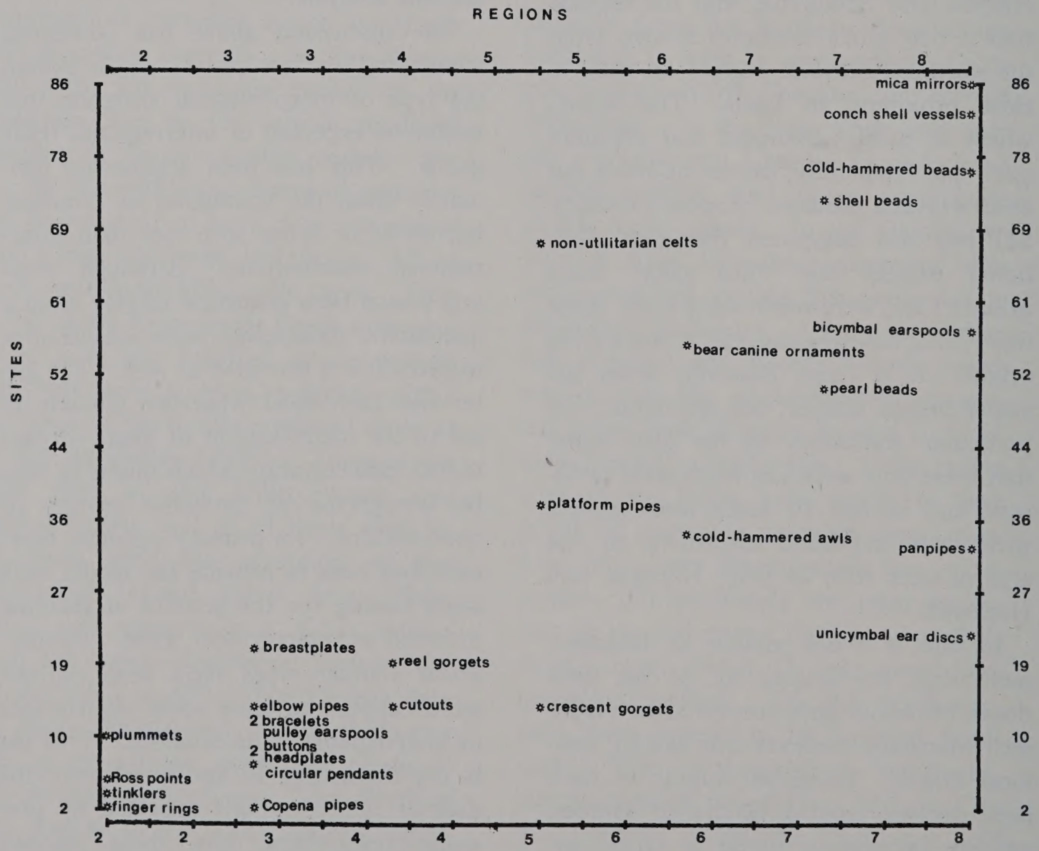

Figure 29. Scatter plot of Interaction Sphere artifact types at Hopewell mortuary sites and within regional traditions

TABLE 13. OCCURRENCE OF INTERACTION SPHERE ARTIFACT TYPES AT HOPEWELL MORTUARY SITES AND WITHIN REGIONAL TRADITIONS

	Sites	Regions
1. bicymbal earspools	58	8
2. breastplates	22	3
3. cutouts	15	4
4. buttons	10	3
5. headplates	9	3
6. tinklers	5	2
7. crescent gorgets	14	5
8. Ross Barbed points	7	2
9. panpipes	33	8
10. platform pipes	38	5
11. mica mirrors	86	8
12. pulley earspools	13	3
13. circular pendants	8	3
14. reel gorgets	20	4
15. elbow pipes	14	3
16. Copena pipes	3	3
17. plummets	11	2
18. conch shell vessels	84	8
19. nonutilitarian celts	69	5
20. shell beads	73	7
21. pearl beads	51	7
22. cold-hammered beads	76	8
23. cold-hammered awls	34	6
24. unicymbal ear discs	23	8
25. finger rings	2	2
26. bracelets	13	3
27. bear canine ornaments	57	6

The question of why these twelve types were culturally important is of course an interesting one. There was no doubt a variety of reasons. Mica mirrors and conch shell containers, for example, were probably important over this range as generalized ritual paraphernalia. Both continue to be present over much of this area in subsequent cultural contexts and into the historic period. On the basis of ethnographic analogy, conch shell vessels were used in conjunction with ceremonial drinks or purgatives over a considerable area (e.g. Swanton 1946, Plate 98). It is difficult to attribute a specific function to mica mirrors, but they were probably important in divination, a function for which they were used in Mesoamerica (Flannery 1976, p. 335; Heyden 1975, p. 142). The importance of beads in the Interaction Sphere is something not generally recognized. They probably served both as ornaments and as media of exchange between groups. Nonutilitarian celts, earspools, bear canines, pipes, and probably panpipes can be viewed as concrete expressions of social position and status. It is of interest to note that many of these artifacts were probably manufactured in the Scioto region.

At this point, the data have been amassed to generate a somewhat more complex model of interregional trade than that put forth earlier in regard to raw materials. The central question, however, is the same. Specifically, this study is interested in determining the structure and complexity of interregional trade, but at this juncture it is possible to incorporate data on the trade of finished goods as well as raw materials. It is hypothesized that the more the evidence suggests that these commodities exhibit correlated distributional patterning on an interregional basis, the greater the likelihood that this exchange system is of the highly structured type suggested by Struever and Houart. As in the previous chapter, factor analysis will be the primary analytical technique and the results of this analysis will be compared with those of the previous model. The reader is referred to pp. 254-55, 306-308, above, for a more detailed discussion of the assumptions, the technique, and the earlier conclusions.

This analysis yielded eight factors with eigenvalues greater than one after fourteen iterations. These eight factors explain 83 per cent of the variance. The communalities of the artifacts and raw materials were in general higher than those produced in the previous analysis, indicating a greater portion of the variance of each variable is reproduced by the factors. For example, only one fourth (5/21 = 24 per cent) of the communalities in the previous analysis were greater than .50 while about half were greater than this figure in the second analysis (26/47 = 55 per cent). This indicates that a stronger correlation exists among variables in the second analysis.

As in the previous analysis, Factor I clearly represents the Hopewell Site. A number of relatively rare raw materials and artifacts are highly loaded on this factor (Table 14). Barracuda jaws, gypsum, finger rings, and mica, other than that used to produce cutouts or mirrors, have the highest loadings on this factor. Factor I does not relate to interregional trade, but, rather, indicates the distinctive nature of the Hopewell Site.

Factor II is quite important. Pearl beads, shell beads, bear canine ornaments, nonutilitarian celts, and conch shell containers are highly loaded on this factor. All of these artifacts have a great deal of importance in interregional exchange relations, a fact summarized in Figure 29. Archaeologically, pearl beads and bear canines are predominantly limited to sites of the northern traditions, particularly the Scioto, Havana, and Crab Orchard traditions, a relationship summarized in Table 12. This factor is interpreted to represent a northern Hopewell interregional trading pattern where the exchange of pearl beads, bear canines, nonutilitarian celts, and conch shell vessels are highly intercorrelated. It should be noted that this factor is in many ways analogous to Factor II in the analysis given above, p. 307, and can be viewed as strong support for the hypothesis that there was in fact a reciprocal trade among these regions of the sort suggested by Struever and Houart. One interesting point here is that, with the exception of conch shell vessels, it is reasonable to as-

TABLE 14. VARIMAX ROTATED FACTOR LOADINGS OF FORTY-SEVEN INTERACTION SPHERE RAW MATERIALS (h^2=COMMUNALITIES, R^2=EXPLAINED VARIANCE, ONLY FACTORS WITH EIGENVALUES GREATER THAN ONE ARE SHOWN)

	I	II	III	IV	V	VI	VII	VIII	h^2
panpipes	.07	.17	.09	–.12	.03	.07	.58	–.04	.46
bicymbal earspools	–.02	.29	.03	.08	.41	.27	.28	–.03	.44
unicymbal discs	–.06	.04	–.03	.14	.04	–.04	.06	.15	.12
pulley earspools	.13	.23	.22	.08	.07	.05	.28	.02	.73
nonutilitarian celts	.07	.47	.02	–.05	.19	.23	–.04	.20	.43
platform pipes	.08	.27	–.10	–.01	–.05	.17	.13	.24	.37
conch shell vessels	.05	.44	.01	.10	.18	–.02	.27	.16	.38
mica mirrors	.06	.31	.03	.00	–.03	.08	.27	.18	.42
cutouts	.17	.12	.14	.08	.00	.48	.12	.05	.58
bear canine ornaments	.06	.44	.03	–.02	–.02	.23	.13	.09	.53
breastplates	.08	.22	.10	–.01	.07	.62	.09	–.04	.53
cold-hammered beads	.07	.23	.07	.13	.46	.03	.00	.15	.50
cold-hammered awls	.11	.18	.18	.12	–.04	.01	.07	.24	.51
Ross Barbed points	.31	.05	–.01	.35	–.06	.39	.00	.16	.43
plummets	.27	–.05	–.02	.39	.06	–.05	.52	.01	.53
elbow pipes	–.02	–.08	–.05	.12	.45	–.08	.07	–.01	.24
Copena pipes	–.03	.03	.04	.49	.13	.09	–.06	–.04	.37
reel-shaped gorgets	–.06	–.02	.01	.08	.58	.01	–.23	–.11	.51
crescent gorgets	.15	.11	.22	.22	.10	.15	.34	–.01	.48
headplates	.34	.18	.22	.23	–.04	.56	.05	.08	.62
shell beads	.08	.70	.06	.21	.03	.00	.14	–.08	.59
pearl beads	.08	.75	.05	.00	–.10	.23	.02	–.03	.69
circular pendants	–.05	.08	–.04	.50	.25	.17	.12	.05	.38
tinklers	–.13	.06	.31	.01	.00	.41	.05	.61	.75
buttons	.18	.07	.20	.15	.04	.66	.12	.09	.60
bracelets	.24	.11	.21	–.02	.26	.34	–.02	–.07	.43
finger rings	.69	.02	.02	.02	–.01	.05	.06	.00	.66
alligator teeth	–.07	.02	.72	.50	–.12	.29	.07	.03	.96
barracuda jaws	.94	.00	.03	.00	.04	.11	.10	.02	.94
copper	.06	.18	.07	.00	.05	.19	.30	.05	.26
shell	.14	.26	.12	.22	.02	.08	.45	–.01	.41
mica	.66	.01	–.08	–.09	.05	.41	.19	–.01	.82
Knife River chalcedony	–.01	.02	–.03	–.04	.06	–.07	–.04	.62	.41
obsidian	.14	.01	.11	.09	.00	.37	.09	.52	.50
quartz	.11	.04	–.03	.16	.13	.23	.20	.01	.53
steatite	–.04	.08	.03	.55	.04	.00	.09	–.02	.36
Ohio pipestone	.28	.10	–.02	–.03	–.02	.04	.04	.05	.56
hematite	.15	.14	–.04	–.01	.22	.02	.01	.00	.38
gypsum	.72	.12	.02	.03	–.01	.10	.00	.00	.57
galena	.08	.09	.08	.02	.66	.09	.10	.17	.55
iron	.30	–.04	.40	.23	.00	.12	.15	.02	.62
pyrites	.48	.07	.02	–.01	–.03	.01	.06	–.01	.26
silver	–.02	.04	.00	.10	.00	.10	.05	–.05	.46
cannel coal	.44	.14	.49	–.13	.09	.15	.14	.04	.56
graphite	.39	.01	–.07	–.07	.07	.22	.18	.02	.33
shark teeth	.14	.01	.15	.27	–.05	.32	.52	.08	.59
pearls	–.07	.06	1.00	–.08	.02	.19	.13	.07	.99
R^2	34.2%	11.9%	8.2%	7.7%	6.5%	5.7%	4.6%	4.2%	

sume, on the basis of the evidence presented now, that artifact classes with high loadings on this factor were manufactured in more than one area. Thus, rather than indicating the type of pattern suggested by Struever and Houart whereby artifacts of raw materials solely available in one area were traded for artifacts solely available in another, the present evidence indicates a group of artifacts circulating among regions that were not controlled in any monopolistic sense by any one of them.

Factor III represents the Turner Site. As with Factor I, it is largely characterized by the high loading of a few raw materials and artifacts that are of minimal importance in the Interaction Sphere. Unaltered pearls, alligator teeth, cannel coal, and iron are the variables with the highest loadings on this factor. Thus, the relationship of Factor III to the problem of interregional trade is rather insignificant.

Steatite other than that represented in interregional artifact types, alligator teeth, Copena pipes, and circular pendants have the highest loadings on Factor IV. These are relatively unimportant exchange commodities that co-occur at Seip. This factor appears to represent this site.

Factor V cannot be viewed as relating to interregional exchange but is interesting nevertheless. Galena lumps, reel-shaped gorgets, elbow pipes, and cold-hammered beads have the highest loadings on this factor. Based on the relatively restricted distributions of these types, this factor appears to represent the Copena region. The fact that this area is so culturally distinct is of some interest in view of the fact that there is a strong continuity in the region, particularly in ceramics, into the historic period, at which time the area was inhabited by Muskogean groups such as the Creeks, Alabama, and Chickasaw. It might be postulated that on the basis of the strongly regional or "ethnic" quality that existed in this area as early as the Middle Woodland period that the Muskogean stock had already become established here.

Buttons, breastplates, headplates, and cutouts have the highest loadings on Factor VI. These clearly relate most closely to the Scioto area, and more specifically to those sites that are typically thought of as especially large and complex, for example, Seip, Hopewell, Tremper, Turner, and Mound City. It does not relate to interregional trade.

Panpipes, plummets, shark teeth, and artifacts made of marine shell other than those specified in the variable list are highly loaded on Factor VII. Plummets and shark teeth are relatively unimportant commodities when viewed from the standpoint of the entire network but appear relatively frequently in both the Scioto and Santa Rosa–Swift Creek areas (see Table 12). Primarily on this basis this factor is viewed as representing interregional trade between the Gulf Coast and Ohio. The shark teeth, plummets, and shell were primarily Gulf Coast products traded or imported northward to the Scioto area. The manufacturing center(s) of panpipes is unclear, but it is tempting to argue on the basis of the distributional information that these are Ohio products traded southward. This argument is compromised, however, by the supposed Mesoamerican origin of the type. It is perhaps best at this time to simply acknowledge that there existed a statistically recognizable interregional path of communication and exchange between these areas. It should be noted that this factor is paralleled by Factor III in the earlier analysis (see p. 307), suggesting that whether or not it is assumed that trade was simply in raw materials or in raw materials plus finished artifacts, the basic link between these two areas appears to exist.

Knife River chalcedony, tinklers, obsidian, awls, and platform pipes have the highest loadings on Factor VIII. The meaning of this factor is somewhat ambiguous, but it may represent interregional trade from the Scioto region to the northern portion of the Havana area. Four of these commodities are present in their greatest concentrations in these areas. Pipes are also shared, but have a considerably wider distribution. For the purposes of this analysis the meaning of this factor will be considered as indeterminant.

In general, the results of a factor analysis performed with the assumption that both raw materials and finished artifacts were traded provides better results than those obtained from the same data, but with the assumption that interregional trade was limited to an exchange in raw materials. It is interesting to note, however, that in both cases conclusions were reached that there is a patterned association of commodities circulating among the Crab Orchard, Havana, and Scioto areas and that there is a factor suggesting a trade link between the Gulf Coast and Scioto Hopewell. Specific conclusions put forth by Struever and Houart (1972, pp. 74-75) regarding reciprocal trade of regional monopolies gain no support in this analysis.

VI

SITE COMPLEXITY AND THE STRUCTURE OF THE INTERACTION SPHERE

Consideration will now be given to the relationships that exist among Interaction Sphere raw materials, artifact types, and site size. These variables are used to construct a measure of site complexity, and the distribution of sites is examined as it relates to the problem of locating centers of trade.

It has recently been suggested by Struever and Houart that during the Middle Woodland period there existed a hierarchical structure of sites serving as various "nodes" in the Hopewell trade network. It has been hypothesized that there were at least four levels within this system, with "regional transaction centers" occupying the top level of this pyramidal structure. According to this model, the regional transaction centers are regularly spaced across the landscape with lower level, satellite communities distributed around them. Goods and services move vertically within the region between centers and less complex sites and are traded interregionally between regional centers (Streuver and Houart 1972, pp. 53, 60).

Importantly, it has been suggested that the criteria whereby regional transaction centers as well as sites occupying lesser positions in this hierarchy can be recognized include such variables as site size, site complexity, and the quantity of Interaction Sphere goods present (Struever and Houart 1972, pp. 52, 61, 63). The nature of the relationship among these variables has not been adequately demonstrated. Struever and Houart suggest that they are positively correlated but do not demonstrate the existence of such a relationship. They proceed to use these criteria, however, to identify the position of particular sites within the structural hierarchy. It should be noted that their general methodology closely parallels those criteria employed by other social scientists working with what has come to be known as central-place theory (see Lloyd and Dicken 1972).

At this point the data necessary to evaluate these hypotheses of Struever and Houart have been amassed. More specifically, it is now possible to test the strength of the relationship among the variables that have been used by these authors to establish their structural model. If this relationship proves to be a significant one, it will then be possible to compare the model of Struever and Houart with one generated by the data presented in the current study. First, however, it is necessary to clarify the significance of several concepts and to relate them to the broader context of central-place theory.

Central-place theory was first developed in geography as a means of explaining the distribution of settlements of varying complexity across the landscape. As with most theories developed in the social sciences, it has subsequently found its way into anthropology and is currently being applied to both archaeological and ethnographic data (e.g. Wilmsen 1973; Skinner 1965; Smith 1974; Wright and Johnson 1975; Crumley 1976).

A major tenet of central-place theory is that since not all goods and services are of equal demand, they will not be available in every community. The greater the demand for a commodity, the greater its range from the source of production. Most communities will produce "low order" goods of limited range such as foodstuffs, while "high order" goods such as the services of a specialized surgeon will be available in relatively few communities. However, in the latter case because of a greater demand there will be a very large effective range. Thus, the lower order goods will be available at a large number of locations while the higher order goods will be found at a relatively small number. This in effect produces a hierarchy of locations with the majority of settlements offering relatively few goods and services while a few offer a wide range of commodities (Lloyd and Dicken 1972, pp. 11-22). This type of pyramidal structure is exactly the type of organization Struever and Houart have suggested for sites participating in the Hopewell Interaction Sphere.

A second major premise of central-place theory is that settlements or locations of varying complexity will assume a particular spatial configuration that will minimize costs. In an idealized setting, this configuration is one of nested hexagons with the site offering the majority of high-order goods occupying the pivotal position. In order to produce this pattern, however, the following conditions must be met: (1) exchange must be integrated and part of a single system; (2) centers exist for the purpose of facilitating trade and thus to minimize the frictional effects of distance; (3) the landscape is a featureless plain; (4) population, hence purchasing power, is continuously and uniformly distributed; and (5) suppliers are numerous and competitive.

No locational analysis can meet all of the conditions necessary for the establishment of a perfect hexagonal system. They are simply too stringent. Thus, deviations from the model can in fact be expected to occur in all studies of this type. They represent the difference between theory and practice. The usefulness of the basic central-place model, however, lies not in its ability to describe real world conditions, but in its potential ability to explain real world patterns from estimates of the effects of specific changes in the basic assumptions (Smith 1974, p. 169). Thus, an important part of any central-place study involves examining the effects that the violation of certain of these assumptions have had on the distribution of settlements.

The first step in a central-place analysis is the construction of a hierarchy of settlement types. Typically, this hierarchy is established by examining the relationships that exist among the number of goods and services available (central functions), the number of businesses engaged in production (establishments), and population size. These variables tend to be highly correlated (see, for example, Barnum 1966, Figures 7, 8, and 9; Lloyd and Dicken 1972, pp. 32-33). The researcher generally identifies the position a particular settlement occupies within the hierarchy by examining the relationship between the number of kinds of goods and services present and the number of businesses engaged in production. A scattergram of this relationship suggests a distribution that approaches that of a linear function near the origin, but that more closely approximates a logarithmic function as values increase. Cases become very infrequent as values on both axes become large and the dispersion or variance of cases about the function decreases. An example of this type of distribution is shown in Figure 30.

The specific method by which settlements are grouped together as units of a particular type (e.g. city, large town, hamlet) involves the inspection of this distribution for major changes in slope and/or the recognition of distinct groups of cases along the function (Berry *et al.* 1962, Figure 7; Lloyd and Dicken 1972, Figure 3.1). It can be a highly subjective process. This element of subjectivity in the creation of a typology, however, should not be completely foreign to the archaeologist, or indeed to any social or biological scientist that must deal with classificatory considerations. An example of this type of classification system is shown in Figure 31.

Struever and Houart have suggested that sites of varying hierarchical position in the Hopewell Interaction Sphere can be identified by their size, complexity, and the quantity of Interaction Sphere goods present. At this point it is possible to relate these variables and their interrelationships to the broader context of central-place theory. Site size, for example, can be viewed as an archaeological measure of population size at a given locality (Naroll 1962; Wiessner 1974). In this study it is assumed that the total mass of mortuary mounds present at a site is the best available measure of site size. The "quantity" of Hopewell Interaction Sphere goods present at a particular location is difficult to interpret, but would seem to include elements of at least two important variables in central-place theory, the number of central functions and the number of establishments. It is argued that the former is best approximated in this archaeological context by measuring the number of kinds of Interaction Sphere goods present at a site, while the latter is seen as analogous to the number of craftsmen engaged in production at the site—a type of data not directly accessible from the archaeological record. Struever and Houart's third variable, "site complexity," is seen in the framework of this study as a dependent rather than an independent variable.

Most central-place theory researchers rely on relating the number of establishments to the number of central functions to generate a hierarchy of locational types. In the Hopewell situation, data on only one of these variables are available. However, since population and the number of establishments are highly correlated (Barnum 1966, Figure 8; Lloyd and Dicken 1972, Figure 3.2; Stafford 1963, pp. 165-75), it is argued that a function of population size to the number of central functions will yield equivalent results. Several studies have in fact used this approach (e.g. Berry *et al.* 1962, Figure 3). Consequently, the number of kinds of Interaction Sphere goods present at a site and site size will be employed in order to test Struever and Houart's conclusions on the nature of Hopewell site structure and distribution. Although these authors limited their

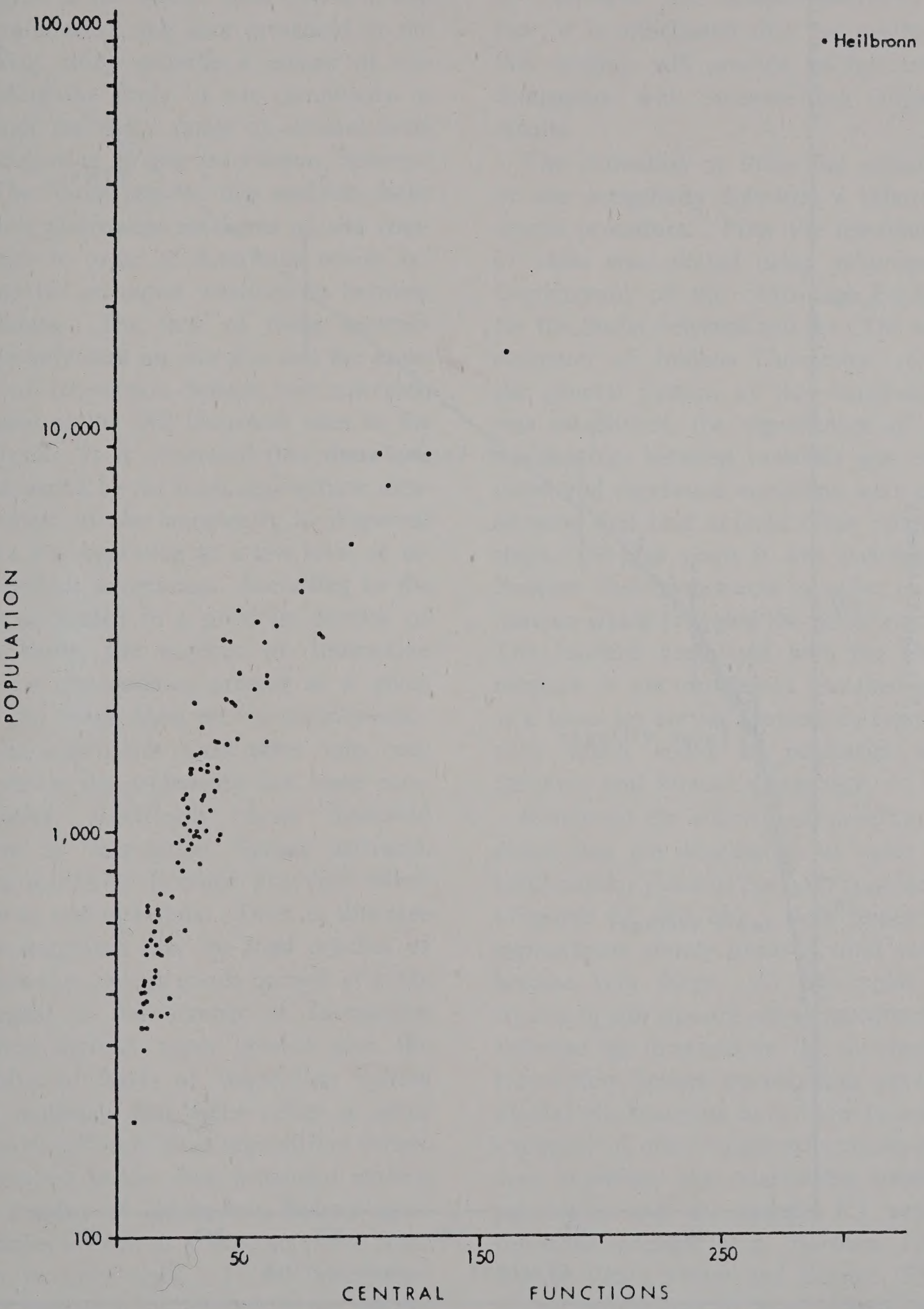

Figure 30. Relationship between population and central functions in Kreis Heilbronn, Germany (Source: Barnum 1966, Figure 6)

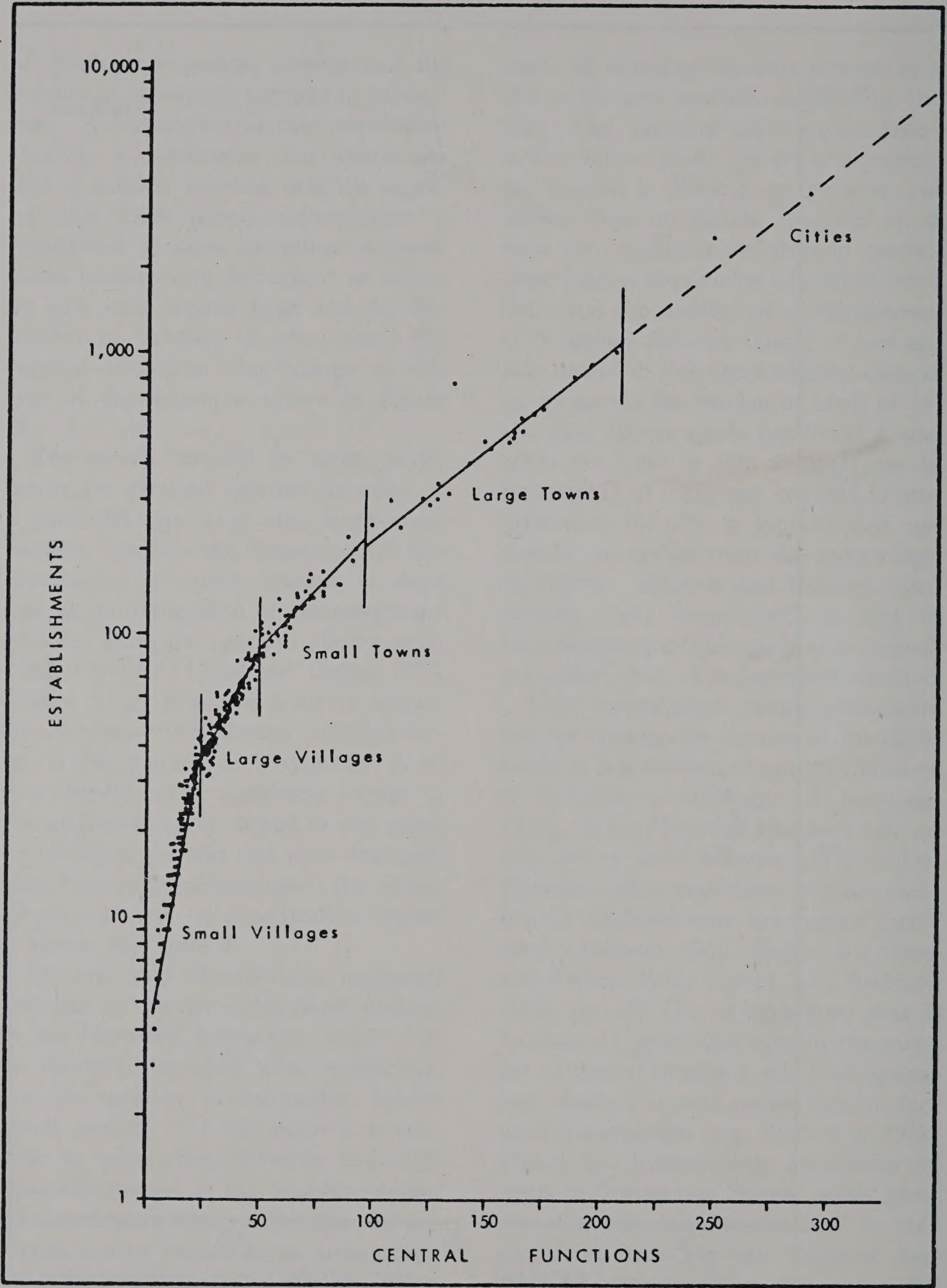

Figure 31. Construction of a hierarchy of locational types for settlements in Baden-Württemberg, Germany, using the relationship between total establishments and central functions (Source: Barnum 1966, Figure 12)

analysis to the Scioto, Crab Orchard, and Havana areas, the data presented in the current study provide a means of expanding the study of site complexity to include the entire range of cultural units participating in the Interaction Sphere.

The initial step in this analysis seeks to test alternative measures of site complexity in order to determine which exhibits the strongest relationship between variables. The first of these incorporates only data on site size and the number of Interaction Sphere raw materials present at the 242 Hopewell sites in the analysis. It is suggested that these criteria would be the most appropriate measurement of site complexity if Hopewell trade was operating at a low level of interregional integration. According to the data presented in a previous portion of this study, the number of Interaction Sphere commodities present at a given site can range from zero to twenty-one.

The alternative view takes into consideration the probability that some commodities, specifically those discussed above as Interaction Sphere artifacts, were traded as finished products rather than as raw materials. Thus, in this case it is suggested that the total number of Interaction Sphere goods present at a site is equal to the number of Interaction Sphere artifact types present plus the number of kinds of Interaction Sphere raw materials that occur either as other types of artifacts or as unmodified forms. According to the data presented earlier, the number of Interaction Sphere commodities present at a site can range from zero to forty-seven. If the interpretations presented are correct, it can be expected that this second alternative will provide the most accurate representation of Hopewell site complexity. In any case, it is anticipated that the results of this analysis will provide an interesting comparison with Struever and Houart's results.

The evaluation of these two measures of site complexity followed a relatively simple procedure. First the distribution of cases was plotted using subprogram Scattergram of the Statistical Package for the Social Sciences and the CDC 6600 computer of Indiana University. Once the general pattern of the distributions was established, the significance of the relationships between variables was evaluated and regression equations were constructed that best defined these relationships. At this point it was possible to compare these constructs in order to determine which provided the better results. The function associated with the better measure of site complexity was then used as a basis for sorting clusters or types of sites which could be compared with Struever and Houart's typology.

Results of the scattergram program indicate that the distribution of cases exhibits similar patterns for both approaches (Figures 32 and 33). Both appear to approximate closely linearity until values become very large. At this point increases in site size are not proportionately reflected by increases in the number of Interaction Sphere commodities present. Similar distributions have been found in a number of other locational analyses that have examined the relationship between population and the number of central functions present (e.g. Barnum 1966; Garner 1967; Yeates and Garner 1971).

The distribution of cases clearly indicates a nonlinear relationship between the number of Interaction Sphere commodi-

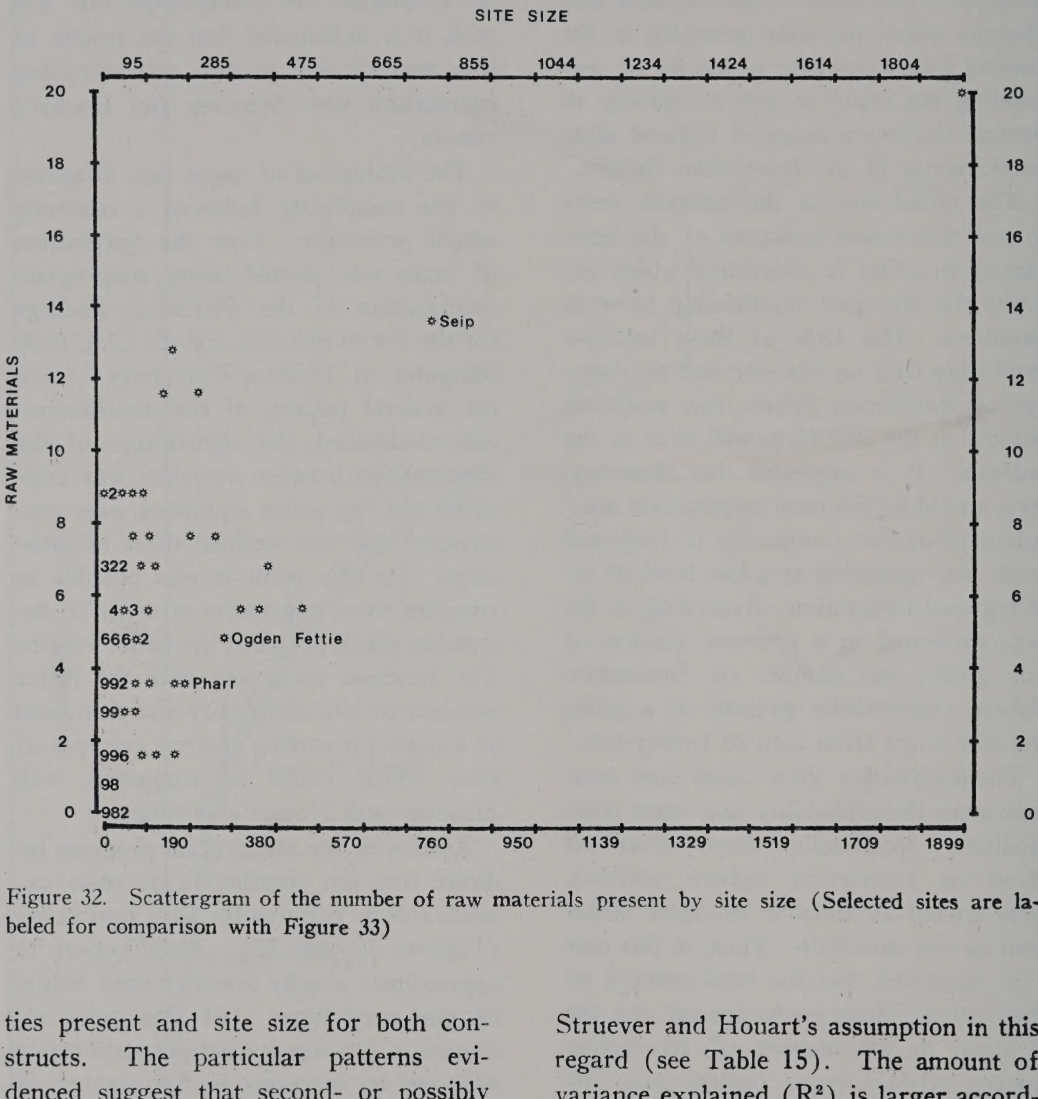

Figure 32. Scattergram of the number of raw materials present by site size (Selected sites are labeled for comparison with Figure 33)

ties present and site size for both constructs. The particular patterns evidenced suggest that second- or possibly third-order polynomial equations would best define the relationship between variables in both cases. Both equational forms were tested using a regression program available in the SPSS package. The results do in fact indicate that there is a significant relationship between the number of types of Hopewell Interaction Sphere commodities present and site size, a finding which confirms the validity of Struever and Houart's assumption in this regard (see Table 15). The amount of variance explained (R^2) is larger according to the parameters established for the second alternative, thus lending support to the hypothesis that this formulation more adequately reflects the nature of Hopewell trade. Consequently, it will serve as the basis for subsequent analysis.

The additional variance explained by increasing the regression equation from a second to a third degree polynomial is very small (less than 1 per cent) for the

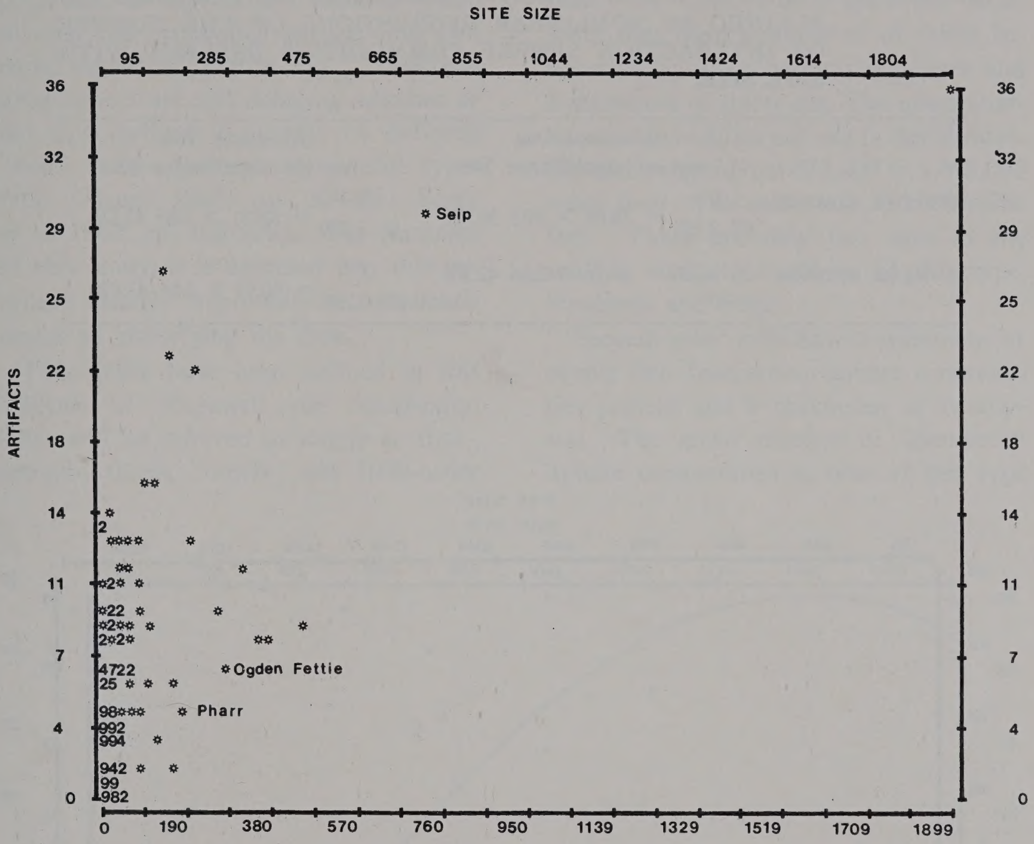

Figure 33. Scattergram of the number of finished artifacts and raw materials present by site size

second alternative. Also, the second-degree equation more closely approximates the functions obtained in a large number of other central-place studies. Therefore, the decision was made to use the simpler form in subsequent analysis. The curve defined by this equation is shown in Figure 34. Its functional form is: no. of H.I.S. commodities $= 3.28781 - .00001$ site size$^2 + .04135$ site size.

Once the regression equation which best describes the relationship between variables had been established, the second stage of this analysis involved sorting the individual cases along this function into five types of varying complexity. Three of these groups formed distinct clusters and could be sorted visually along the function. The remaining sites were so densely concentrated at the lower end of this distribution that no further visual patterns were recognizable. Consequently, these sites were arbitrarily divided into two divisions by constructing a line per-

TABLE 15. TESTS OF SIGNIFICANCE AND AMOUNT OF VARIANCE EXPLAINED BY NONLINEAR REGRESSIONS OF THE NUMBER OF INTERACTION SPHERE COMMODITIES PRESENT WITH SITE SIZE

	Alternate One test of significance	Alternate One R²	Alternate Two test of significance	Alternate Two R²
2d degree equation	$F_{.05\ 2,239} = 78.68 > 3.03$	39.7%	$F_{.05\ 2,239} = 88.21 > 3.03$	42.5%
3d degree equation	$F_{.05\ 3,238} = 57.76 > 2.64$	42.1%	$F_{.05\ 3,238} = 60.91 > 2.64$	43.4%

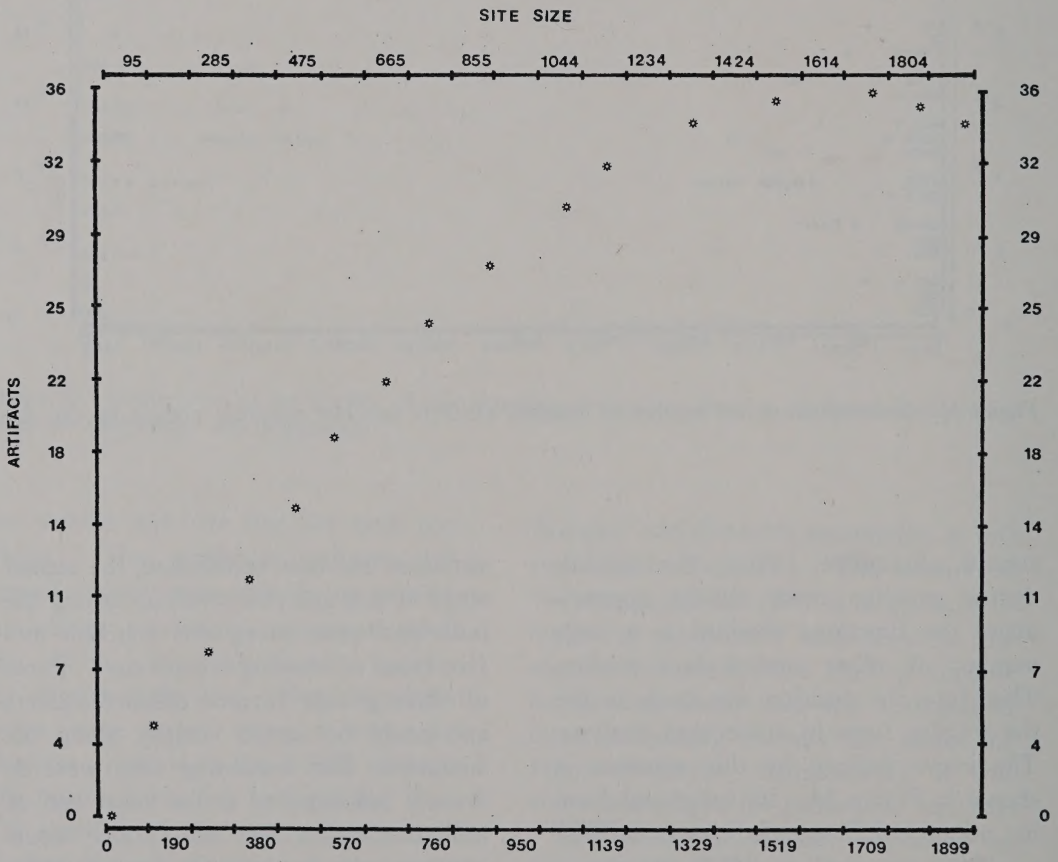

Figure 34. Curve defined by the equation: H.I.S. commodities $= 3.28781 - .00001$ site size$^2 + .04135$ site size

pendicular to the defined function which divided the remaining portion into two equal segments (Figure 35). Locational geographers are still debating whether or not this method is capable of defining "real" rather than simply useful types (e.g. Garner 1967, pp. 324-25; Berry *et al.* 1962, pp. 102-103). For purposes of this study, it is assumed that this approach merely represents a systematic means of classifying the data.

Five types have been defined in this analysis of Hopewell site complexity. They will be referred to simply as first-, second-, third-, fourth-, and fifth-order sites. As denoted in Figure 35, first-order sites have a minimum of thirty Interaction Sphere commodities present and a maximum of thirty-six. The mean number of commodities per site is thirty-three. Site size ranges from 672,000 to 1,899,000 cubic feet. The mean is 1,285,000 cubic feet. There are only two sites in the analysis that are members of this type, Hopewell and Seip.

Second-order sites have a minimum of twenty-two Interaction Sphere commodities present and a maximum of twenty-six. The mean number of Interaction Sphere commodities at sites of this type

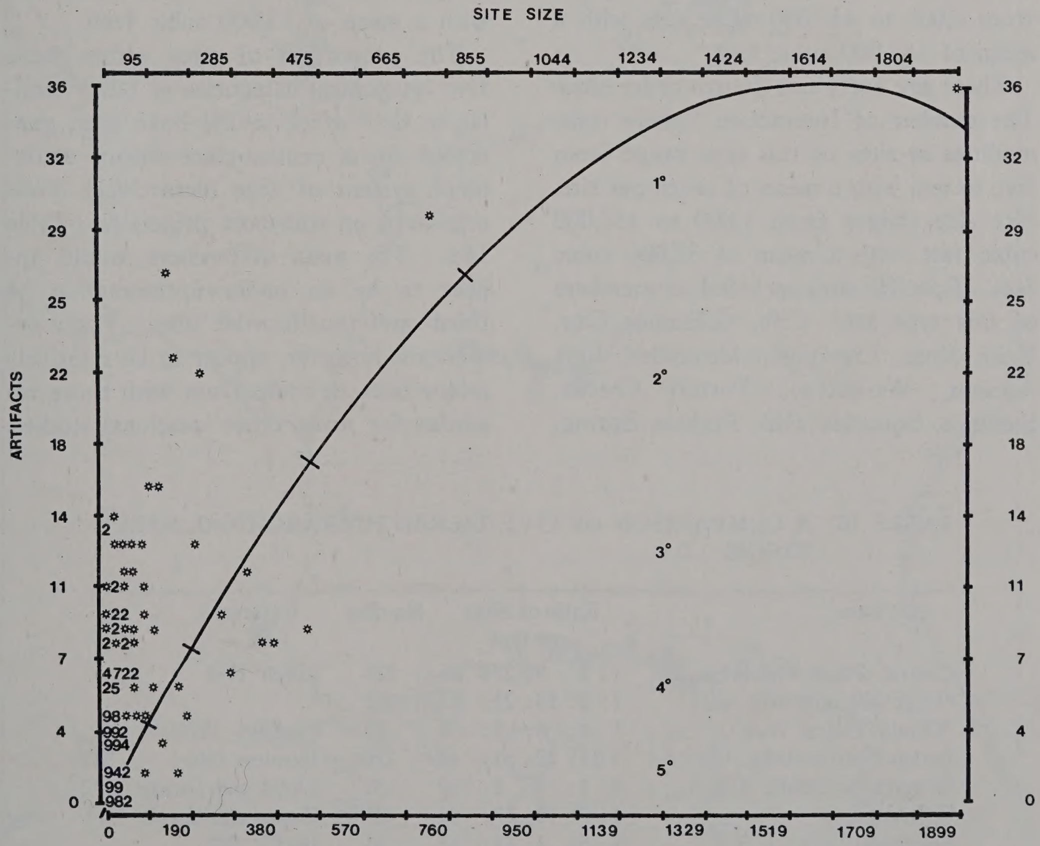

Figure 35. Construction of a hierarchy of locational types for Hopewell mortuary sites using the relationship between site size and the number of Interaction Sphere commodities present

is twenty-four. Sites range in size from 131,000 to 204,000 cubic feet. The mean is 164,000 cubic feet. Turner, Harness, and Mound City are included in this type.

There are twenty-five third-order sites. They include: Knight, Schwert, Bedford, Cincinnati, Baehr, Montezuma, Naples, Havana, Ogden-Fettie, Crystal River, Esch, Ater, Rutherford, Tremper, Murphy Island, Davenport, Klunk, Wilson, Gibson, Roden, Albany, Norton, Tunacunnhee, North Benton, and Newcastle. The number of Interaction Sphere commodities present range from seven to seventeen. The mean number for third-order sites is twelve. Site size ranges from 6,000 to 437,000 cubic feet with a mean of 133,000 cubic feet.

There are forty-two fourth-order sites. The number of Interaction Sphere commodities at sites of this type range from five to ten, with a mean of seven per site. Site size ranges from 1,000 to 157,000 cubic feet with a mean of 32,000 cubic feet. Specific sites included as members of this type are: Crib, Columbus City, Yent, Ross, Liverpool, Alexander, Fort Ancient, Wright(s), Porter, Crooks, Samuels, Squackie Hill, Perkins Spring, Fischer, Weaver, Frederick, Pierce, Converse, Bourneville, Tick Island, Goodall, Sioux Coulee, Portage, Glass, Porters Bar, Snyders, Kraske, Toolesboro-1, Helena, L. Gay, Mann, Pharr, Rector, Hannah, Rockhold, Campbell, Twin Merchandise, Lauderdale, Mound House, Dickison, Peisker, and Mandeville.

All of the sites in the analysis that are not included in the first four types are fifth-order sites. There are 170 sites in this category. The number of Hopewell Interaction Sphere commodities present at sites of this type range from zero to six. The mean number is two. Site size ranges from 1,000 to 148,000 cubic feet with a mean of 13,000 cubic feet.

The proportion of sites within these five typological categories is fairly similar to that which would have been generated for a central-place theory settlement system of five hierarchical levels organized on transport principles (Table 16). The main differences would appear to be an under-representation of third- and fourth-order sites. These deviations, however, appear to be relatively minor ones in comparison with those recorded for many other locational studies.

TABLE 16. A COMPARISON OF FIVE-TIERED HIERARCHICAL STRUCTURES

System	Ratio of Sites per type	Number	Reference
Central Place Theory model	1: 3: 9: 27: 81	121	Losch 1954
*Hopewell mortuary sites	1: 2: 13: 21: 85	242	
*Diyala Plains, Iraq	1: 4: 4: 4: 8	39	Crumley 1976
Baden-Württemberg, Ger.	1:11: 22: 51: 44	256	Barnum 1966
Niagara peninsula, U.S.A.	1: 1: 2: 5: 10	37	Lloyd and Dicken 1972
U.S.A. cities	1: 7: 18: 67: 96	189	Yeates and Garner 1971
Southwest S.D., U.S.A.	1: 5: 1: 11: 13	31	Berry 1967

* archaeological data

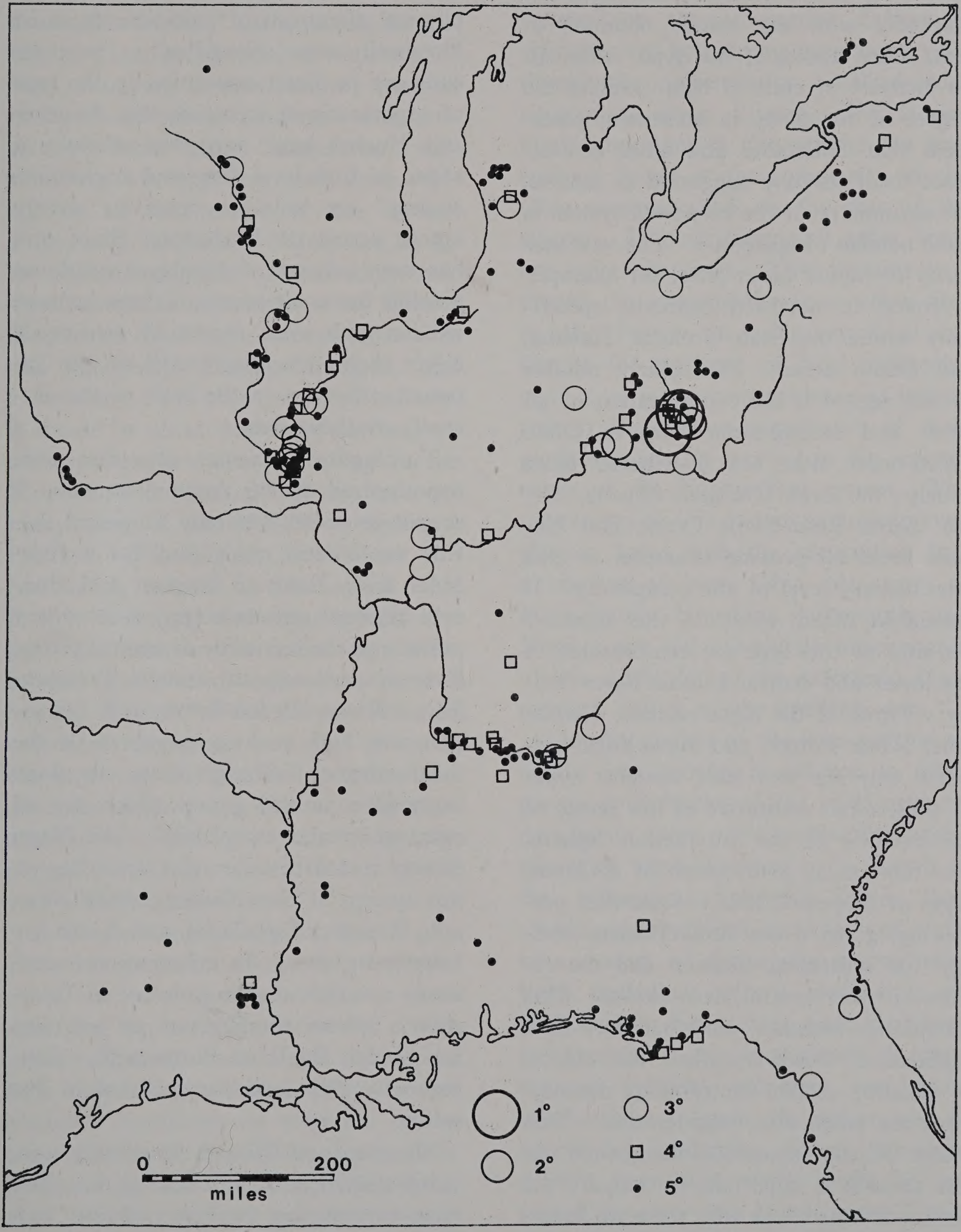

Figure 36. Distribution of Hopewell mortuary sites showing their relative complexity

Much more important for purposes of this analysis is the fact that the spatial patterning of Hopewell sites contrasts markedly with the results obtained in most other studies of this type. Although no analysis of cultural data exhibits the degree of regularity in settlement placement that Christaller and other central-place theorists have suggested as models, the asymmetry of the Hopewell system is quite notable (Figure 36). The vast majority of higher order sites, for example, is found in northern contexts, specifically within the Crab Orchard, Havana, and Scioto areas. Particularly notable in this regard is the concentration of all first- and second-order sites in Ohio. Third-order sites are distributed more widely; the Crab Orchard, Copena, Scioto, Santa Rosa–Swift Creek, and Havana areas all provide examples of this intermediary level of site complexity. It should be noted, however, that most of the sites of this type are concentrated in the lower and central Illinois River Valley. Three of the eight regions, Marksville, Miller-Porter, and New York, evidence only the two least complex types of sites, a fact indicative of low levels of participation in the Interaction Sphere. The nonregular distribution of different types of Hopewell sites is somewhat perplexing, given a cost-minimization strategy for settlement location and the results of other central-place studies. This distribution becomes somewhat more comprehensible, however, when the effects of violating certain central-place assumptions are taken into consideration. This theme will be expanded subsequently; at this point it is important to compare the results obtained here with those of Struever and Houart.

The results of this study cast considerable doubt on the validity of Struever and Houart's argument regarding the physical placement of particular types of Hopewell sites. Specifically, these results are in direct opposition to the type of organizational structure that Struever and Houart have suggested whereby a series of high-level "regional transaction centers" are seen as relatively evenly spaced across the landscape. Since care has been taken to duplicate as nearly as possible the assumptions of these authors, we can with some degree of confidence reject their structural model of the Interaction Sphere on the basis of the currently available data.

Turning to particular sites that were hypothesized to be regional centers, it should be noted that only Hopewell fulfills the criteria established for a first-order site. None of Struever and Houart's regional centers occupy a secondary position in the hierarchy of central places. Four of their regional centers, Trempealeau, Albany, Ogden-Fettie, and Cincinnati, are high ranking members of the third category, although there are many other sites in this group which are of equal or greater complexity. The Mann Site is a fourth-order site according to this system of classification, while Newark, Marietta, Twenhofel, and North are fifth-order sites. No information is currently available on the presence of Interaction Sphere commodities or site size for Golden Eagle or Portsmouth. Consequently they were not included in this study.

Struever and Houart have only provided classificatory information on other types of sites for the lower Illinois Valley. In the case of these sites, major discrepancies also exist between the results of these authors and those presented here. Struever and Houart's twelve "local transaction centers," for example, are pictured as an evenly spaced sequence of sites occupying an intermediary position in the classificatory framework with clusters of lower order "cemeteries" surrounding and dependent upon them. According to the results of the current study, only Baehr and Naples are of intermediate complexity as denoted by their classification as third-order sites. Mound House and Peisker are fourth-order sites and Meridosia, Kamp, Merrigan, and Collins are fifth-order sites. Similarly, it should be noted that many of the low-ranking cemetery sites according to the Struever and Houart typology are actually sites of considerable complexity. Bedford, Gibson, and Pete Klunk are particularly notable in this regard. Although additional data may modify the particular position that sites occupy within the classificatory scheme presented here, it is doubtful that these will be of sufficient magnitude to affect seriously the basic pattern and will certainly not alter the conclusion that a more rigorous application of the basic methodology employed by Struever and Houart yields very different results.

It is one thing to suggest that a previous interpretation of the data is inadequate and quite another to offer a more satisfying explanation. However, at this juncture it seems necessary to try. It has been shown that although Struever and Houart's arguments are premised on the assumptions of central-place theory, their methodology leads them to false conclusions. Rather than a system of homogeneously spaced central places closely approximating the hypothetical models suggested by Christaller, Losch, and other locational theorists, the placement of the "nodes" on the Interaction Sphere is characterized by extreme asymmetry. Although the concentration of third-order sites in the lower Illinois Valley is certainly important in this regard, the preeminent factor is the complexity of the Ohio subarea vis à vis the rest of the system. In comparison, all other areas are quite simplistic. This remains true despite the accelerated rate at which sites in other regions are being excavated and despite the tendency of local archaeologists to view this new evidence as indicative of the greater importance of their particular area of interest in the maintenance of the Hopewellian system. The asymmetry of this system is put into even sharper focus with the recognition that a number of large Ohio sites such as High Banks, Hopeton, Portsmouth, and Newark are not adequately incorporated in this study due to the extremely fragmentary nature of the available data.

The recognition of the true position of Scioto area peoples in relation to other groups participating in the trade network necessarily alters one's perspective on the nature of what has come to be known as the Interaction Sphere. Rather than viewing interregional exchange and trade as a system of reciprocity among relatively equivalent cultural units, it is argued that the Scioto area must have been in a position to dominate almost all interregional political, economic, and social relationships. Again, the major way in which the Interaction Sphere structure differs from that which might be expected according to a more "normal" central-place distribution is the complexity of the Ohio system.

According to central-place theory, central-places are located so as to minimize costs and maximize profits, and it must be assumed that the concentration of complex sites in the Scioto region is consistent with this principle. The important question at this point, therefore, is why does the observed distribution differ so markedly from the expected central-place pattern? There are no doubt a number of factors that are involved here, but three are seen as particularly important.

Smith (1974, p. 169) has noted that deviation from the central-place assumption of a uniform, featureless landscape is one of the most important factors causing non-Western settlement distributions to differ from the hexagonally patterned model. It might be anticipated then that certain geographic considerations must be taken into account in seeking to explain the Hopewell situation. The nonuniform distribution of key resources is viewed as particularly significant in this regard.

The trade of exotic rocks and minerals, either as raw materials or as finished artifacts, is an essential feature of the Hopewell phenomenon. The archaeological evidence suggests that there was a considerable demand for these commodities throughout the system. Earlier in this study the source areas for many of these materials were discussed in some detail. The evidence indicates that these materials were certainly not very homogeneously distributed across the breadth of the Interaction Sphere and in some cases had highly localized source areas. It is obvious that transport costs for acquiring these materials would have varied throughout the network of sites as a function of location. It is hypothesized, therefore, that proximity to a wide range of resources would have offered certain commercial advantages to particular sites or groups of sites.

Table 17 shows the average distance from the source areas of the five most important Interaction Sphere raw materials to the highest ranking center in each region. It is clear that the average distance is much greater for the Marksville, Santa Rosa–Swift Creek, and New York areas than for the other regions. Since site complexity is in part dependent upon the number of different raw materials present, it is suggested that the lack of development in these areas is partially a function of their peripheral position to key resources. The other regions are about equal in their proximity to major resources and are clearly closer than the three areas discussed above. Thus, although the availability of important raw materials helps to explain why major centers did not develop in some areas, it is not sufficient to explain why the concentration of very complex sites is found solely in Ohio and not in areas such as the Crab Orchard and Havana regions.

A second variable that contributed to the skewed distribution of Hopewell sites is the particular pattern of historical development that took place in the Scioto area. One of the assumptions of central-place theory is that suppliers are numerous and widespread throughout the system. It is argued here that the unique history of the Scioto area contributed to the establishment early in the development of the Interaction Sphere of a monopoly or near-monopoly over certain materials, and that other areas were simply never able to compete. This in turn accelerated the divergence of the Ohio system

TABLE 17. AVERAGE DISTANCE OF THE HIGHEST RANKING SITE IN EACH REGION TO THE NEAREST SOURCE OF THE FIVE MOST IMPORTANT RAW MATERIALS THAT DO NOT CO-OCCUR IN PARTICULAR RESOURCE ZONES AND THAT ARE AVAILABLE IN RELATIVELY LIMITED AREAS

Site	Region	Copper	Marine Shell	Mica	Galena	Pipestone	Mean Distance (mi.)
Hopewell	Scioto	614	678	247	444	39	404
Squackie Hill	Point Peninsula	594	1014	567	647	394	643
Knight	Havana	592	728	489	222	419	490
Roden	Southern Appalachian	906	333	206	508	350	461
Crystal River	Santa Rosa-Swift Creek	1317	0	481	897	686	676
Rutherford	Crab Orchard	683	575	317	353	303	446
Crooks	Marksville	1122	436	603	417	725	661
Pharr	Tombigbee	900	383	322	389	433	485

from those in other areas. More specifically, certainly the fact that Adena (Webb and Snow 1945), the most elaborate cultural manifestation in the preceding Early Woodland period in terms of its commitment to the acquiring of exotic goods and burial ceremonialism, was also focused in the Scioto–Paint Creek area has to be considered as a significant factor in the development of Ohio Hopewell (Griffin 1964, p. 241). Given the strong technological continuity between late Early Woodland and Middle Woodland, it should be anticipated that given new innovations in political, economic, social, or religious spheres, the most successful or "advanced" complex would be best positioned to take advantage of these innovations (Barnett 1953). This "headstart," hence lack of competition on an initial level, has often been shown to lead to the reaping of the excessive profits of monopoly. Smith (1974, p. 178) notes that economics of scale can feed back into primate centers so that potential competitors never reach parity with them. Viewing this from the perspective of the Interaction Sphere, it might be expected that this factor would lead to a concentration of specialized production and procurement in the Scioto area.

A third factor contributing to the concentration of high-order sites in the Scioto–Paint Creek area is the more elaborate socio-political organization of cultural groups in this area. Previous central-place studies have been undertaken in contexts where the locations under study were operating under the same basic form of social organization. Usually this is the industrial nation-state. This certainly is not the case with Hopewell, and it is argued that this has effected the deviation of the distributional pattern from the central-place theory model.

Struever (1968, pp. 16-21) has argued previously that whereas other regions during the Middle Woodland period were operating at a "tribal" level of social organization, the Scioto area was a "chiefdom" (Service 1962). In addition to the complexity of the mortuary sites, evidence for a higher level of sociopolitical integration in Ohio can be seen in: (1) the incorporation of burial mounds into formally planned complexes which also include geometric earthworks, graded ways, and pyramidal mounds, and (2) the huge quantities of Interaction Sphere goods which are locally consumed. The former represents the presence of sufficient political power to initiate the construction of large-scale public works and the latter a vehicle for the reinforcement of various status positions in the power structure (Webb 1974, p. 367). Thus, it is suggested that the complexity of the Ohio sites was in part facilitated by this type of social organization.

To suggest that the complexity of Ohio mortuary sites was in part the result of a more elaborate social structure in the area seems quite logical on the basis of the present evidence. However, this really does not contribute very much to a real understanding of the problem unless the important question of *why* this type of social organization should develop in Ohio rather than in other areas can also be answered. Consequently, at this point this issue must also be discussed in some detail, and a shift made from discussing variables directly affecting site complexity to variables with indirect effects via their importance in establishing a complex social structure in Ohio. As a hypothesis, it is suggested that particular physiographic factors were of primary importance in stimulating the organizational differences evident between the Scioto region and other areas. In presenting this argument, settlement and geographic information will be drawn from a variety of areas, but will focus on comparing the Scioto and Havana regions. Figures 37, 38, and 39 serve as a basis for comparing the drainage networks of these two regions.

Across much of the Midwest the transition from Early to Middle Woodland is marked by an intensified utilization of the resources available in the major river valleys and in a corresponding de-emphasis on a wide variety of other physiographic contexts. In the Crab Orchard, Havana, and Copena areas this is specifically marked by the establishment of permanent or semipermanent villages on the first terrace and talus slopes of the larger valleys (Struever and Houart 1972, p. 63; Walthall 1974, pp. 590, 595; Winters 1961, pp. 45, 51). In Ohio, habitation sites appear to be more closely correlated with the flood plain (Prufer 1967, p. 316; personal communication). We can with some justification accept Winters's (1961, p. 51) contention that these shifts in orientation indicate that Middle Woodland peoples were doing something besides shooting deer and gathering nuts. The increasing frequency with which cultivated and "encouraged" seed crops are being recovered from Middle Woodland contexts is unquestionably important in this context, although the "mudflat horticulture" (Struever 1968) framework in which these resources are usually discussed must be rejected (Munson n.d.).

In Ohio this shift in subsistence-settlement orientation is marked by the retrenching of an Adena complex which had continued to expand throughout the Early Woodland period back to the mouth of a few major river valleys and its original area of concentration, the central Scioto Valley (Fischer 1974, pp. 184, 269, 350-55). The valleys of large northerly flowing streams such as the

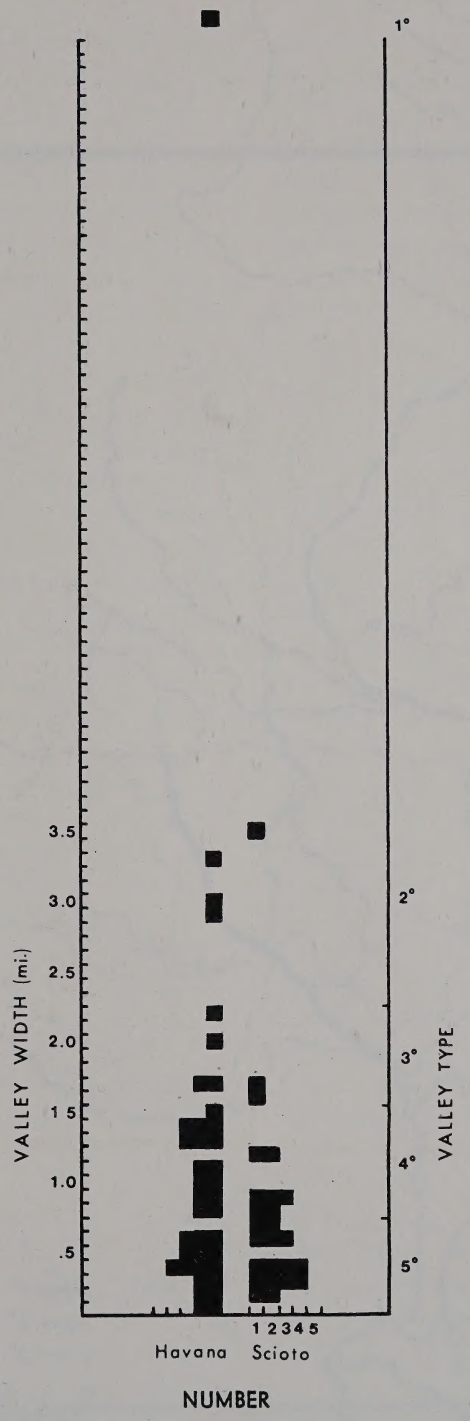

Figure 37. Effective valley widths (average valley width minus channel width) in the Scioto and Havana regions divided into five valley types

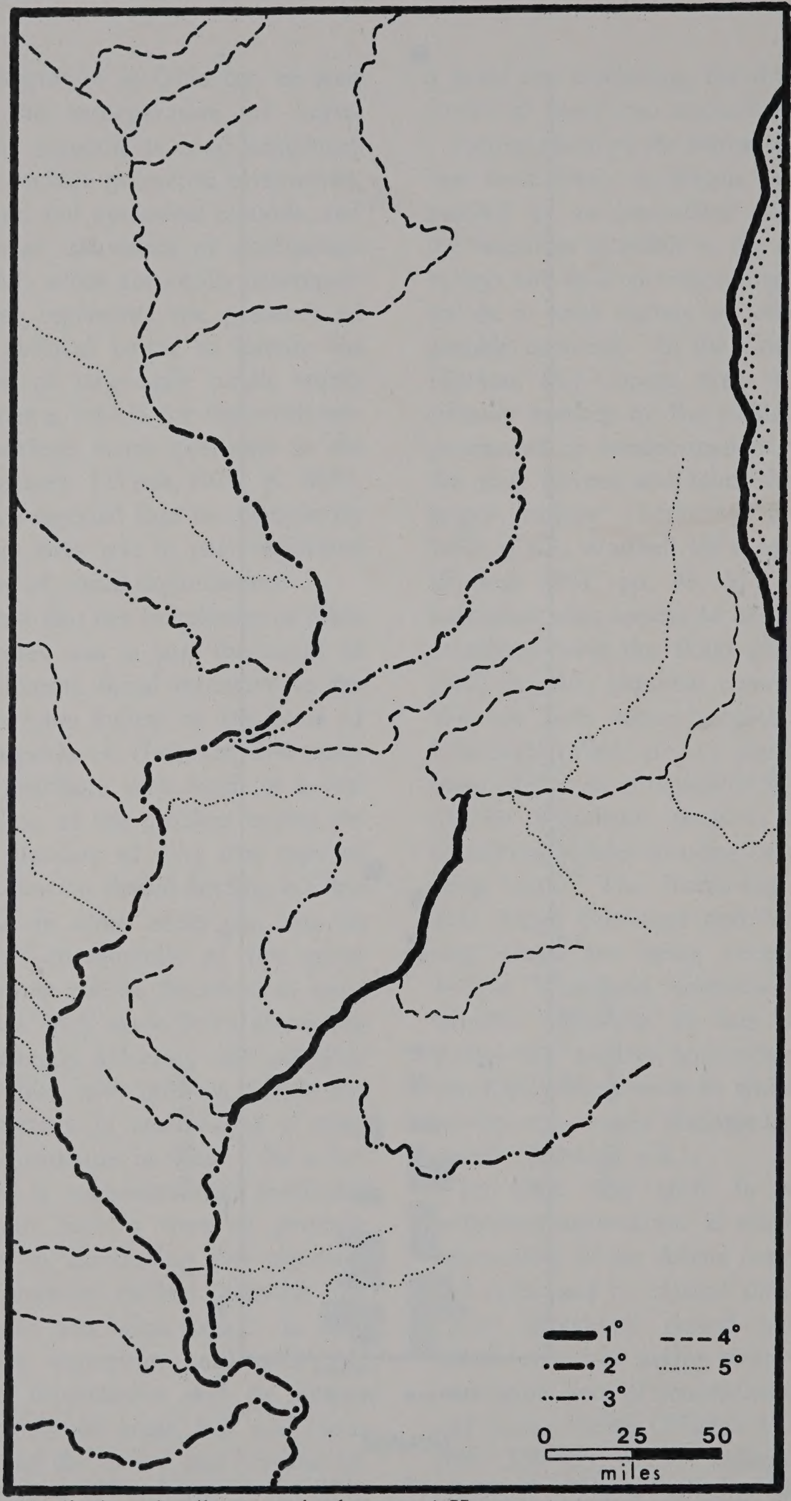

Figure 38. Distribution of valley types in the central Havana area

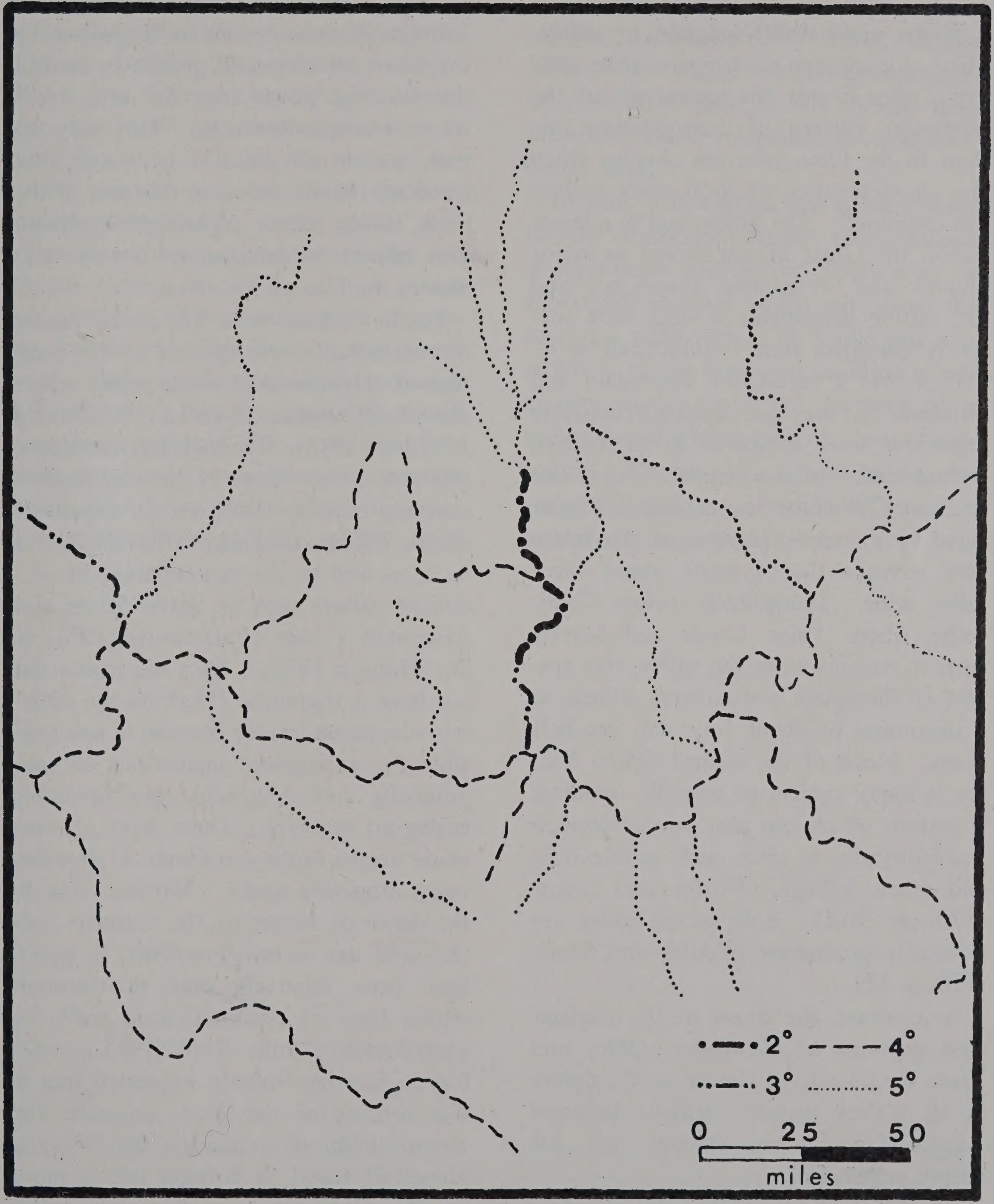

Figure 39. Distribution of valley types in the central Scioto area

Kentucky, the Licking, the Big Sandy, and the Kanawa rivers, areas that had supported considerable Late Adena populations, were virtually abandoned.

Given a general floodplain or valley-floor reorientation over much of the eastern United States, the advantages of the particular pattern of consolidation evident in the Ohio area are obvious when the characteristics of local river valleys are examined. The Scioto and to a lesser extent the Great Miami served as major Illinois and Wisconsin sluiceways and are cutting principally in what were formerly glaciated areas (Goldthwait *et al.* 1965). As a result, the floodplain and adjacent terraces are disproportionately expansive when compared to the modern stream size. In the central Scioto Valley near Chillicothe, the uplands are separated by a complex system of floodplain and terraces that average about three miles wide. Immediately below Chillicothe where Paint Creek and several smaller streams enter the valley, this system of floodplain and terraces widens to a maximum of about four and one-half miles. Much of the central Scioto Valley is today subject to periodic flooding, a pattern which can also be documented prehistorically at sites such as McGraw and Blain Village (Prufer and Shane 1970, pp. 8-12). Soils in the valley are unusually productive (Prufer and Shane 1970, p. 12).

In contrast, the rivers of the unglaciated portions of Kentucky, Ohio, and West Virginia have almost no floodplain at all. They transect heavily dissected Appalachian Plateau country and are deeply entrenched.

The Ohio River itself was not intensively utilized in either the Early or Middle Woodland periods, except in those few areas where major tributaries enter the valley. Struever and Houart (1972, p. 56) suggest that this association in Middle Woodland can be explained by the desire of Hopewell groups to control the flow of goods into the area from these strategic locations. This may be true, but it should also be noted that these are the only areas in this part of the Ohio Valley where expansive floodplain and terrace formations are found relative to the size of the river.

In the Havana area this initial period of reorientation was marked by the location of settlements at those points where secondary streams entered the Illinois (Munson 1976). Through time as choice physiographic settings in the area reached carrying capacity there was an expansion of the Havana tradition to the north and west as well as the reoccupation of secondary valleys such as Spoon River and Macoupin Creek (Farnsworth 1973, p. 26; Munson 1976). This expansion did not have a traumatic effect on the existing adaptation largely because it was possible for expanding populations to ease gradually into less and less favorable ecological contexts. There were no dramatic breaks in the continuum of decreasingly attractive areas. Further, due to the dendritic nature of the drainage pattern and low stream gradients, it would have been relatively easy to maintain strong lines of communication with the parent cultural unit. Hall (1973, pp. 62-63) in fact has already suggested that it was because of the area's potential for almost unlimited expansion that Havana Hopewell failed to develop into a more complex, integrated social system. Put somewhat differently, it is suggested that the cost of expansion of the social system measured against those of a major reorganization of the social system would have been relatively low.

It is hypothesized here that exactly the opposite condition was obtained in Ohio; that is, that the cost of geographic expansion was much greater than the cost of reorganization. In Ohio the contrast between primary and secondary environmental contexts is much more pronounced, and both upland topography and stream pattern would have been much less conducive to the maintenance of communication and trade links to the parent area. Thus, given population increases it is suggested that the costs that would have been incurred via expansion into more marginal environmental contexts would have been greater than the costs of increasing the complexity of the social system. The general importance of environmental and cultural circumscription as a mechanism of culture change has been discussed at length by other anthropologists (Carneiro 1968; 1970; Service 1975). It is suggested that environmental circumscription in the Scioto area stimulated the development of ranked societies here.

In sum, it is argued that at least three factors contributed to the concentration of high-order sites in the Scioto area: a geographic location which minimized the cost of a wide variety of exotic raw materials, a strong historical tradition of acquiring exotics, and the presence of a ranked- or chiefdom-type of social organization. The latter is seen as having developed largely as a result of environmental circumscription.

VII

SUMMARY AND CONCLUSIONS

"Hopewell" has been an important concept in eastern United States archaeology for a number of decades. Interpretations regarding its origin, meaning, and demise, however, have undergone a number of transformations with changing archaeological perspectives. One very visible trend has been the tendency to view Hopewell as an increasingly complex cultural phenomenon, a trend which in part correlates with the increasing frequency with which sites of Hopewellian affiliation have been excavated and recognized. Caldwell's (1964) "interaction sphere" concept is currently the theoretical framework within which the Hopewell data are typically discussed, and the concept itself has been applied with increased frequency in other contexts such as formative Mesoamerica and Peru.

Subsequent to Caldwell's initial work, the nature of the Hopewell Interaction Sphere has been discussed with increasing specificity, and a number of conclusions have recently been put forth in the literature, most notably by Struever and Houart (1972). The present study has been concerned with carefully examining the evidence for Hopewell interregional trade in order to support or refute several of Struever and Houart's major conclusions. The two areas isolated for investigation included the pattern of interregional exchange and the hierarchical structure of the system itself. More specifically, Struever and Houart have argued: (1) that clearly recognizable patterns of Hopewell interregional trade existed in specific commodities, and that these can be documented using stylistic and distributional information, and (2) that trade took place within a regularly spaced, hierarchically ordered structure of transactional centers. The present study has focused on assessing the validity of these conclusions.

The first step in this analysis involved establishing a data base which could be used to test further Struever and Houart's conclusions. Eight major regional traditions were defined, and the nature of the Hopewell horizon in each of them explored in some detail. Within these regions, 242 mortuary sites were identified, and a record was made of their spatial distribution, size, and the types of raw materials and finished artifacts present in each of them. These data provided a basis for a number of interregional comparisons.

As it is currently depicted, the Hopewell Interaction Sphere was primarily a mechanism for the interregional exchange of specific commodities. This exchange had to take place either in raw materials or finished products. The theoretical ramifications of each of these are somewhat different, and it was deemed important in a general sense to determine the primary level(s) at which trade took place. On a more specific plane, Struever and Houart have concluded that particular goods followed prescribed exchange patterns, and the present study was concerned with empirically supporting or refuting their position. Alternative models of interregional trade were established, one premised on an exchange limited to raw materials and the other on assumption that certain classes of finished goods as well as raw materials were circulating through this system.

If trade was principally in raw materials, it was considered important for analytical purposes to identify initially those materials with interregional distributions in Hopewell contexts, to locate their source of origin, to determine their relative economic importance, and to interpret the cultural significance of particular distributional patterns. Twenty-one raw materials with interregional distributions were examined. The potential sources of the materials specified in this study show considerable variation from those listed by Struever and Houart. In general, many raw materials were more available than these authors have suggested. Although sources of origin showed considerable variability, several major "resource zones" have been defined where a number of separate materials could have been acquired in a relatively limited area. The economic importance of these raw materials, as defined by their density and range of occurrence, showed considerable variation. Such materials as mica, copper, and galena were highly important, while others such as gypsum, pyrites, and graphite had minimal impact on interregional trade. The Scioto area exhibited by far the greatest concentration of interregionally distributed raw materials.

In order to analyze this distributional information, a principal-component factor analysis was performed using the presence of these twenty-one materials at Hopewell mortuary sites as variables. It was hypothesized that if interregional trade in raw materials was a highly regularized process, then materials involved in particular exchange relations would exhibit correlated distributional patterns which would be manifested as high loadings on the same factors. Results showed that the distributional correlation among these variables is not great, a fact interpreted as indicating that interregional trade according to this model was not highly structured. Further, of the factors produced in this analysis, only two appear to relate to interregional trade. Factor II evidenced high loadings for certain materials found principally in "northern Hopewell" contexts. Factor III suggests a correlation among materials found principally in the Santa Rosa–Swift Creek and Scioto areas. These are interpreted as supporting the hypothesis that regularized interregional trading patterns did exist among various Hopewell groups, but on a rather limited basis.

These results serve as a basis for comparison with those obtained from a similar analysis premised on a somewhat more complex view of Hopewell interregional trade. The latter makes the additional assumption that exchange was taking place in finished goods as well as in raw materials. In order to evaluate the adequacy of this second alternative, it was first necessary to identify those artifact classes with interregional distributions. Twenty-seven classes were defined. Within many of these, particular specimens or populations with locally distributed stylistic characteristics could be eliminated from consideration as potential Interaction Sphere commodities. In addition to the qualitative data provided on the distribution of these types, quantitative information was also provided whenever possible. The latter was used as additional data in locating potential areas of manufacture, but was also intended to provide the reader with some feeling for the relative amount of material in circulation. Sources of manufacture could not be located with the degree of specificity that Struever and Houart suggest. In the majority of cases where particular manufacturing areas could be identified on the basis of the above criteria, they were within the Scioto region.

Paralleling the methodology employed in the preceding section on raw materials, the relative importance of each of these artifact classes was then assessed. Conch shell containers, mica mirrors, cold-hammered beads, bicymbal earspools, non-utilitarian celts, bear canine ornaments, shell beads, pearl beads, platform pipes, cold-hammered awls, and panpipes are the most important artifact classes in interregional trade. The importance of some of these classes, especially beads, has not been generally recognized. Other classes that have been viewed in previous studies as major items of Hopewell trade, for example, pulley earspools and Copena pipes, appear to be of marginal significance.

A factor analysis was performed on these distributional data. Results showed a greater degree of association among variables than in a similar analysis where it had been assumed that interregional trade took place only in raw materials, thus supporting the position that a greater volume of Hopewell trade was in finished goods. Only two factors in this analysis could with some degree of confidence be interpreted as relating directly to the problem of interregional trade. Factor II indicated a "northern Hopewell" pattern common among sites of the Scioto, Havana, and Crab Orchard areas. Specific artifact classes with high loadings on this factor included pearl beads, shell beads, bear canine ornaments, non-utilitarian celts, and conch shell vessels. All of these classes were among the most important in the analysis in terms of their range and density. A second factor, Factor VII, suggests a patterned association between the Scioto and Santa Rosa–Swift Creek areas. Commodities with high loadings on this factor included panpipes, plummets, shark teeth, and marine shell. None of these goods were among the most important categories, although panpipes were relatively widespread. Both Factor II and Factor VII were interpreted as having resulted from the association of particular commodities in interregional patterns of exchange. It should be noted that while these results in general support Struever and Houart's conclusion of a reciprocal trade among regions, the specific goods in question were not those that these authors had suggested.

It had been concluded by Struever and Houart that Hopewell trade took place within a highly complex, hierarchically structured network of sites. Their explanation of the characteristics of these sites suggests an informal application of central-place theory. In the present study, after having amassed a considerable body of data on site size and the distribution of various artifacts and raw materials, two typologies of site complexity were established using principles derived from central-place theory. One of these was premised on interregional trade taking place principally in raw materials, while the other assumed trade in both raw materials and finished products. The more complex alternative demonstrated a statistically closer relationship between site size and the number of commodities present. Consequently it was used in subsequent phases of analysis to construct a typology of site complexity. The spatial distribution of the five resultant types was then compared with the distribution of sites in Struever and Houart's typology.

The results of the present study do not support Struever and Houart's model for the spatial distribution of sites of varying complexity. Most important in this regard is the fact that in contrast to Struever and Houart's position that the most complex Hopewell sites were quite evenly spaced across the range of the Interaction Sphere, the results of the present analysis suggested that they were clustered in Ohio. This pattern takes on further significance with the recognition that numerically the bulk of the Interaction Sphere artifacts and raw materials was concentrated at these sites. Struever and Houart posited that the distribution of complex sites correlated with particular features such as major river confluences and other major paths of communication. It has been suggested in the present study that the clustering of relatively complex sites in Ohio can be explained by their proximity to Interaction Sphere resources, the presence of a local cultural trajectory which emphasized burial ceremonialism and the accumulation of exotica, and a more complex political organization. It has been hypothesized that the latter developed in the Scioto area as a result of an increased subsistence efficiency and environmental circumscription.

This study suggests that the Hopewell Interaction Sphere was not a particularly dynamic or integrated exchange system. If the distribution and density of interregional commodities found in mortuary contexts is in fact representative of the larger population, then the volume of interregional trade was rather low and the distribution of these goods extremely variable. The fact that the majority of the Interaction Sphere commodities were concentrated in Ohio, together with the clustering of complex sites in this area, suggests that interregional trade was predominantly a one-sided proposition, with the cultural groups of the Scioto area occupying the pivotal position. When it is considered that this study has emphasized a synchronic rather than a diachronic view of Hopewell, the largely unstructured nature of the Interaction Sphere network becomes even more apparent.

Despite this emphasis on devitalizing the system, it is suggested that the Hopewell Interaction Sphere can continue to be a useful concept. It still represents a relatively brief interval in eastern United States prehistory when the interregional trade in many commodities was at a maximum. It is suggested, however, that some care should be taken to recognize that "interaction sphere" as it applies in this context does not mean the same thing as it does when applied to the complex trading networks of such areas as Mesoamerica and Peru. Just as the term "formative" applied to Hopewell, Chavin, and Olmec should be viewed as formative only to subsequent development in the area, rather than as a broad, pancultural stage of social evolution, so, too, it must be recognized that the "interaction sphere" concept has merit only as it is applied to relatively limited cultural contexts.

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